SHARP **SERVICE MANUAL**

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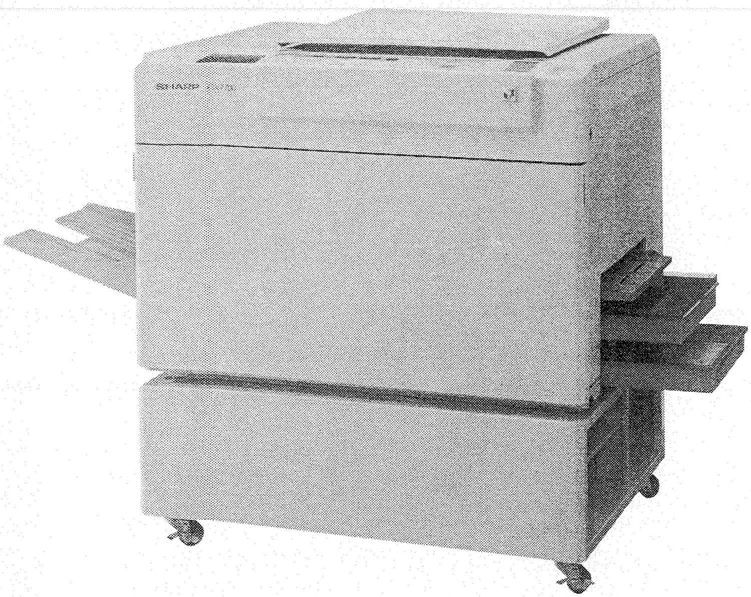

# MODEL CX-7700

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SHARP CORPORATION

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# INTRODUCTION

The CX-7700 is a higher version of the CX-7500 with the following changes from the CX-7500.

1. To improve color copy quality, the 6-scan (2-scan for each of Y, M, and C) process is employed in each of the low density area (screen photo) and the high density area (graphic mode) in the full color photo mode.
2. To improve serviceability, the test function is provided for adjustment of the automatic toner concentration sensor level.
3. Selection of graphic/photo mode is available in the slide projector mode.

The major differences in the operational specifications are as follows:

## 1. Copy speed

| Paper size | Copy mode | Copy speed | |
|---|---|---|---|
| | | CX-7700 | CX-7500 |
| A4, B5, (8½" x 11", 5½" x 8½") portrait | Full color (Graphic mode) | 7.5 sheet/min | 7.5 sheet/min |
| | Full color (Photo mode) | 4 sheet/min | 7.5 sheet/min |
| | Single color (R, G, B) | 11 sheet/min | 11 sheet/min |
| | Single color (Y, M, C) | 22 sheet/min | 22 sheet/min |
| | Black-white | 22 sheet/min | 22 sheet/min |
| A3, B4, (11" x 17", 8½" x 14") A4, B5, (8½" x 11", 5½" x 8½") landscape | Full color (Graphic mode) | 3 sheet/min | 2 sheet/min |
| | Full color (Photo mode) | 2 sheet/min | 2 sheet/min |
| | Single color (R, G, B) | 3 sheet/min | 3 sheet/min |
| | Single color (Y, M, C) | 11 sheet/min | 11 sheet/min |
| | Black-white | 11 sheet/min | 11 sheet/min |

R: Red, G: Green, B: Blue, Y: Yellow, M: Magenta, C: Cyan

## 2. First copy

| Copy mode | First copy A4 (8½" x 11") portraot | |
|---|---|---|
| | CX-7700 | CX-7500 |
| Full color (Graphic mode) | 21 sec | 21 sec |
| Full color (Photo mode) | 30 sec | 21 sec |
| Single color (R, G, B) | 19 sec | 19 sec |
| Single color (Y, M, C) | 15 sec | 15 sec |
| Black-white | 15 sec | 15 sec |

## 3. Counter recall

(Recall by the counter recall key in the color adjustment panel)

| No. | CX-7700 | | CX-7500 | |
|---|---|---|---|---|
| 0 | Total scan number display (for A4 paper) | | Total scan number display (for A4 paper) | |
| | Full color (Graphic mode) | --- 3 counts | Full color (Graphic mode) | --- 3 counts |
| | Full color (Photo mode) | --- 6 counts | Full color (Photo mode) | --- 3 counts |
| | Single color (R, G, B) | --- 2 counts | Single color (R, G, B) | --- 2 counts |
| | Single color (Y, M, C) | --- 1 count | Single color (Y, M, C) | --- 1 count |
| | Black-white | --- 1 count | Black-white | --- 1 count |
| 7 | Full color photo mode copy quantity display | | — | |

## 4. Slide copy mode selection key

| CX-7700 | CX-7500 |
|---|---|
| When making full color copy in the slide copy mode, selection of graphic/photo mode is available. (When making Single color/black-white copy, only the graphic mode is available.) | In the slide copy mode, only the graphic mode is available. |

## 5. Auto exposure adjustment

| CX-7700 | CX-7500 |
|---|---|
| When the manual/auto select key is pressed for 5 sec, the machine goes into the auto exposure level adjustment mode. Then exposure level can be adjusted in 9 steps with the copy exposure adjustment key. | Exposure can be adjusted in 4 steps (DARK, STANDARD, LIGHT 1, and LIGHT 2) with the auto exposure adjustment key. |

# [1] BASIC SPECIFICATIONS

Type: Desk-top
Copying system: XEROGRAPHIC
Original kinds: Sheet, books, photographs
Original size: Max. A3 (11 × 17") (432mm x 297mm)
Copy size: Max. A3~B5 (11 × 17"~8 1/2 × 5 1/2") (432mm x 297mm~139mm x 216mm)

**Copying speed** GR: Graphic, PH: Photo

| Copy size<br>Copy mode | A4, B5 (8 1/2" × 11", 5-1/2" × 8 1/2") Portrait | A3, B4 (11" × 17", 8-1/2" × 14") A4, B5 (8-1/2" × 11") Landscape |
|---|---|---|
| Full color copy GR | 7.5 copies/min | 3 copies/min |
| Full color copy PH | 4 copies/min | 2 copies/min |
| R, G, B, single color | 11 copies/min | 3 copies/min |
| Y, M, C single color | 22 copies/min | 11 copies/min |
| Black and white copy | 22 copies/min | 11 copies/min |

**First copy**

| Copy mode | Copy speed |
|---|---|
| Full color copy GR | 21 sec (A4 or 8 1/2" x 11" portrait) |
| Full color copy PH | 30 sec (A4 or 8 1/2" x 11" portrait) |
| R, G, B single color | 19 sec (A4 or 8 1/2" x 11" portrait) |
| Y, M, C single color | 15 sec (A4 or 8 1/2" x 11" portrait) |
| Black and white copy | 15 sec (A4 or 8 1/2" x 11" portrait) |

Regardless of the copy magnification ratio selected, the copy speed is determined by the copy mode and paper size selected.

Warm-up time: About 7 min (At the rated voltage, room temperature of 20 degree C, humidity 65%)

Multicopying: 1 ~ 99 sheets (10 key input, count down), auto repeat

Magnification ratio: 64% ~ 154% (91 steps in 1% increment)
AB series; 70%, 81%, 86%, 100%, 115%, 122%, 141%
Inch series; 64%, 77%, 95%, 100%, 121%, 129%, 141%

Exposure system: Slit exposure with moving optical system (stationary original table, variable light source illumination)

Automatic exposure system: Area photometry is made in synchronization with exposure. In the full color graphic mode only photometry (pre-scanning) is made before exposure.

Paper feed system: Double cassette automatic paper feed and manual bypass single sheet paper feed tray.

| Item<br>Feed system | Paper size | Paper weight | Paper type | Capacity |
|---|---|---|---|---|
| Manual paper feed | A3~B5 (11" x 17"~8-1/2" x 5-1/2") (For paper of 105g/m² (90kg) (24 lbs) or heavier, A4 (8 1/2" x 5 1/2") or smaller.) | 60~128g/m² (52~110kg) (16 ~ 28 lbs) (For 8-1/2 x 5-1/2 and 8-1/2 x 11 "P": 16 ~ 34 lbs) | Plain paper, OHP paper, | 1 sheet |
| Cassette paper feed | A3~B5 (11" x 17"~8-1/2" x 5-1/2") | 60~85g/m² (52~73kg) (16~24 lbs) | Plain paper | About 250 sheets |

Developing system: Magnetic brush development (Two components, toner (+), carrier (–))
Toner supply: Automatic toner concentration control
Photoconductor: Organic PC
Cleaning system: Blade cleaning
Charging system: –DC corona (scorotron)
Transfer system: Primary transfer (-DC transfer roller x 2)
Secondary transfer: (–DC transfer roller x 1)
Discharge system: Discharge lamp
Separation system: Natural separation
Original reference position: Center reference
Transport system: Transport roller, suction belt
Light source: Halogen lamp 100V system 300W × 2 pcs. 200V system 330W × 2 pcs.
Power source: AC100V 50/60Hz
AC120V, 60Hz
AC220V, 50Hz
AC240V, 50Hz
Power consumption: Max. 1.5KW, standby: 250W (25°C)
Fusing system: Upper heat roller and lower pressure roller; (Both silicone)
(Heater lamp 700W + 300W) 100V series
(Heater lamp 700W + 350W) 200V series
Physical dimensions: 930 (W) × 647 (D) × 665mm (H)
36 5/8" (W) × 26 1/4" (D) × 26 1/4" (H)
Machine installation space: 1,535 (W) × 647mm (D)
60 1/2" (W) × 26 1/4" (D)
Weight: About 160Kg (400 lbs)

**Accessories**

Cassette: 1 pc. each (*)
Exit tray: 1 pc.
Toner collection bottle: 2 pcs,
Oil valve: 1 pc.
Fuser oil: 1 pc.
Fuser oil for installation 1 pc.
PC cleaner blade: 1 pc.
Machine level adjust spacer 6 pcs
Instruction manual: 1 pc. (*)
Delivery Installation Report: 1 pc.
Tag card: 1 pc. (SEEG only)
Guarantee certificate: 1 pc. (SCA only)
Corona cleaner 1 pc.
Used oil bottle 1 pc.

**(*) Cassette**

Inch series (SEC/SECL): 11 × 17", 8 1/2 × 11", 8 1/2 × 11"R
AB series (SEEG/SUK): A3, A4, A4R
AB series (Others): Universal, A4, A4R

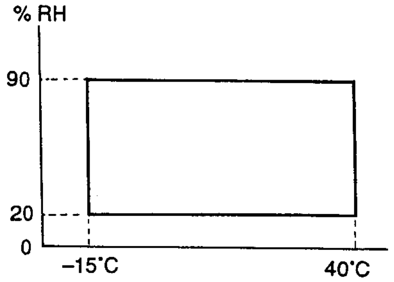
**Option**

Cassette:
A3 (SF-880 A3)
B4 (SF-880 B4)
A4 (CX-750 A4)
A4R (SF-880 AR)
17 inch (SF-880 EC)
Legal (SF-880 CC)
Letter (CX-750 BC)
Letter R (SF-880 LR)
Invoice (SF-880 AC)
Universal (SF-880 UC)

Counter:
Copy auditor (SF-425)
Personal counter (SF-71A)
Personal socket (SF-71B)

# [2] SUPPLIES

## 1. Storage environment and guaranteed period

| Supplies \ Item | Warranty period | Storage environment |
|---|---|---|
| PC belt | 24 months from production month |  |
| TX belt | 24 months from production month | |
| Developer | 24 months from production month | |
| Toner | 24 months from production month | |

(Under factory sealed conditions)

## 2. Life and replacing cycle

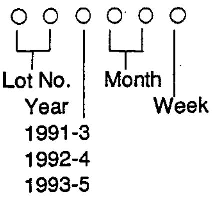
| No. | Supplies | Content | Life, Replacing cycle | Model name SEC, SECL | Model name SEEG, SUK | Model name SCA, other export |
|---|---|---|---|---|---|---|
| 1 | Toner (Black) | Toner (200g) x 1 | *1 | CX-750MT1 | CX-750T1 | CX-750LT1 |
| 2 | Color toner (Cyan) | Toner (200g) x 1 | — | CX-770MT6 | CX-770T6 | CX-770LT6 |
| 3 | Color toner (Magenta) | Toner (200g) x 1 | — | CX-770MT7 | CX-770T7 | CX-770LT7 |
| 4 | Color toner (Yellow) | Toner (200g) x 1 | — | CX-770MT8 | CX-770T8 | CX-770LT8 |
| 5 | Developer (Black) | Developer (1kg) x 1 | 20K copy | CX-750MD1 | CX-750DV1 | CX-750LD1 |
| 6 | Color developer kit | Developer (Each 1 kg)<br>(Cyan) x 1<br>(Magenta) x 1<br>(Yellow) x 1 | 10K copy<br>(10K scan)<br>*2 | CX-770MD9 | CX-770DV9 | CX-770LD9 |
| 7 | Cleaner blade kit | PC cleaner blade x 2<br>TX belt cleaner blade x 1<br>PC belt drive roller cleaner x 1<br>Vinyl bag x 1 | 20K scan | CX-770BK | CX-770BK | CX-770BK |
| 8 | PC belt | PC belt x 1 | 40K scan | CX-750DR | CX-750DR | CX-750DR |
| 9 | TX belt | TX belt x 1 | 20K scan | CX-750TB | CX-750TB | CX-750TB |
| 10 | Upper heat roller | Upper heat roller x 1 | 10K copy | CX-750UH | CX-750UH | CX-750UH |
| 11 | Cleaner roller kit | Upper fusing cleaner roller x 1<br>Lower fusing cleaner roller x 1<br>Fuser blade x 1 | 20K copy | CX-750RL | CX-750RL | CX-750RL |
| 12 | Fuser roller oil | Fuser oil (700g) x 1<br>Oil valve x 1 | 10K copy | CX-770NB | CX-770RB | CX-770RB |
| 13 | Lower heat roller | Lower heat roller x 1 | 40K copy | CX-750LH | CX-750LH | CX-750LH |
| 14 | Secondary TX roller cleaner blade | Secondary TX roller cleaner blade x 1<br>Vinyl bag x 1 | 10K copy | CX-750TR | CX-750TR | CX-750TR |

*1: In the case of A4 (8-1/2" x 11") size and 6% black document, approx. 5,500 sheets can be copied.

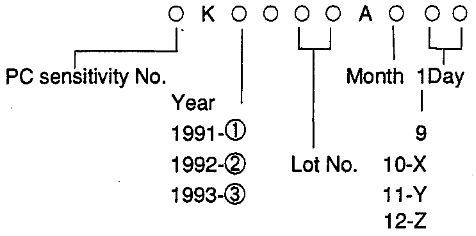
*2: In the CX-7700, each color of one copy is counted as 2 scans. (1 scan for LD and 1 scan for HD)
Therefore, the color developer kit life is 10K scan.

## 3. Identifying supply manufacturing dates:

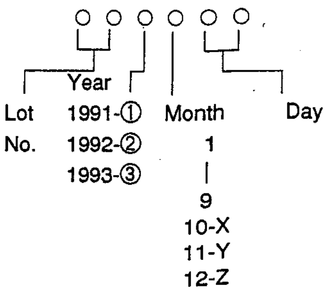
DEVELOPER/TONER



PC BELT



TX BELT



# [3] UNPACKING AND INSTALLATION

**[Tools required]**

- Plus screwdriver
- Small minus screwdriver for adjustment
- Knife
- Cloth
- Test chart (KODAK gray scale, or UKOG-0089CSZZ resolution check chart)
- Scale

## 1. Unpacking

### A. Copier body

① Remove PP band.

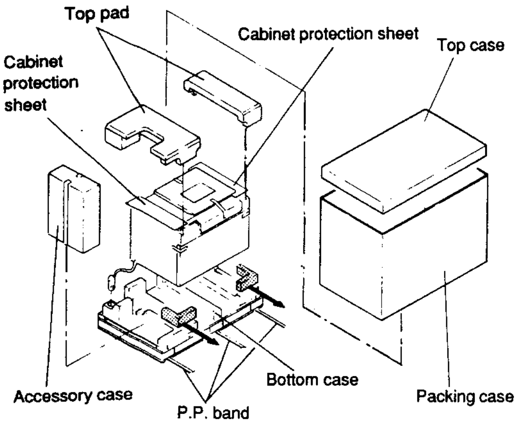
② Pull the top case and packing case upwards.

③ Remove the top pad.

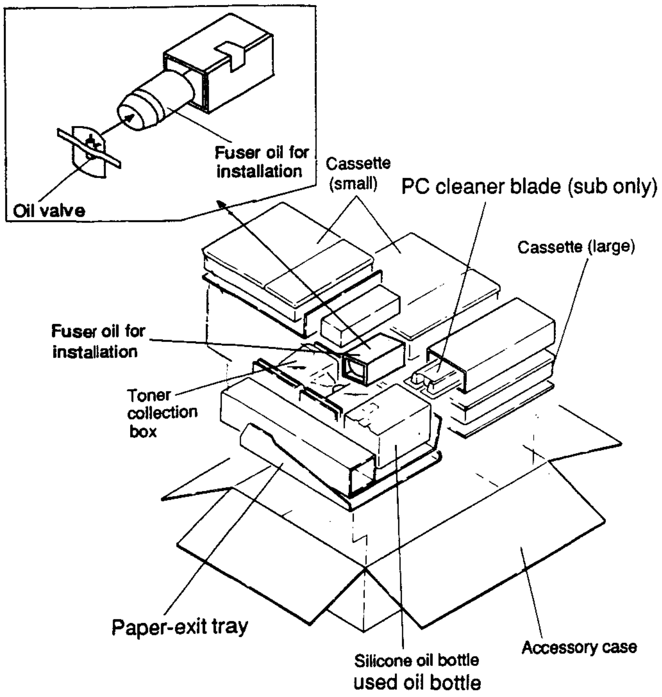
④ Remove the accessory case.

⑤ Remove the copier body protecting cover and the exterior protecting sheet.

⑥ Pull out the blocked part ( ▨ ) of the bottom case in the direction of arrow and pull out the transit levers.


Top pad
Cabinet protection sheet
Top case
Cabinet protection sheet
Accessory case
P.P. band
Bottom case
Packing case

### B. Accessories


Fuser oil for installation
Oil valve
Cassette (small)
PC cleaner blade (sub only)
Cassette (large)
Fuser oil for installation
Toner collection box
Paper-exit tray
Silicone oil bottle
used oil bottle
Accessory case

## 2. Installation of set

**Installation conditions**

Since installation conditions may affect machine performance, observe the following requirements.

### A. Environment

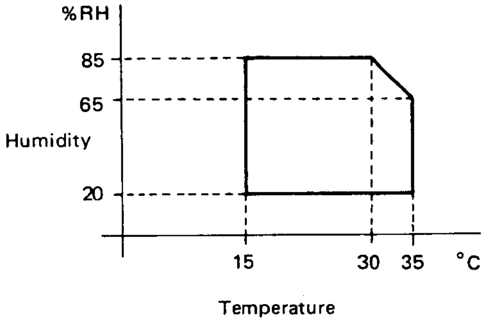
① Avoid installation in direct sunlight or bright locations near a window.
Direct sunlight may deform the plastic components and the document cover. Frosted glass cannot avoid this trouble.

② Avoid installation in a hot, humid place or where sudden temperature change may occur (near a cooler or heater, etc.)

If not, moisture is likely to form dew inside the machine causing paper misfeeds or poor copying.

Standard conditions (Recommended conditions for machine operation):
20 ~ 25°C, 65 ±5%RH

Allowable temperature/humidity range:
15 ~ 30°C, 20 ~ 85%RH; 35°C, 65%RH



③ Avoid installation in a dusty place.
Intrusion of dust may cause poor copying and malfunctions.

④ Avoid installation in an unstable place.
To maintain proper operation the machine should be installed on a flat and stable surface.

⑤ Avoid installation in a poorly ventilated place.

⑥ Avoid installation near inflammable materials or in the presence of ammonia gas. Installation near a diazo copy machine (blue print) may lead to a deterioration of copy quality or malfunctions.

⑦ Install near a power outlet.

### B. Space around the copier

The copier requires at least 10cm (4") of clearance between the rear side and the wall. This space is required for proper cooling fan ventilation. Allow adequate working space around the machine for ease of operation.

### C. Level adjustment

When installing the copier, use a level on the table glass.

If necessary, use machine level adjusting spacers (see page 3-5).

(Note) If the copier is not installed horizontally, it may cause tracking troubles of the PC belt or the TX belt, and fuser oil leak.

### D. Power source

① Use a power source of 15A (200V series 7A) or more capable of supplying at least 90% of rated voltage at full load.

② A dedicated power supply line is required.

### E. Grounding

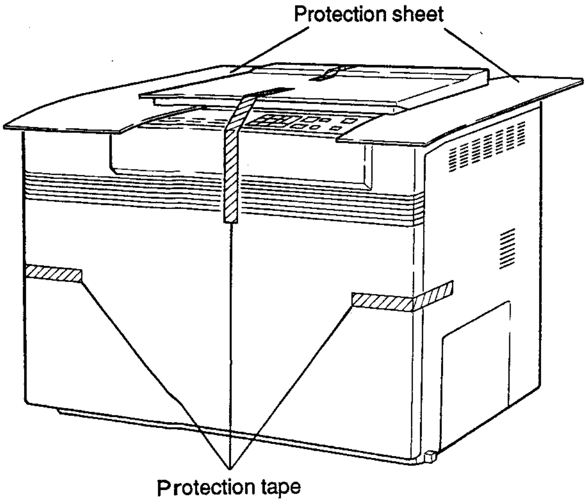
① Be sure the machine is properly grounded.

② Never connect the grounding wire to gas piping.

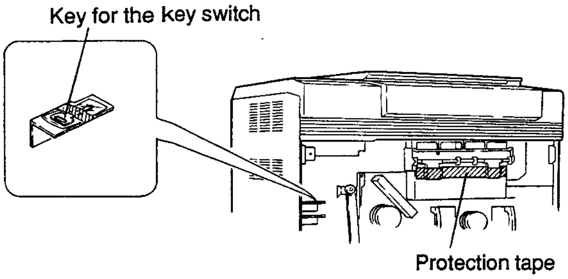
## 3. Removing protection tape & unlocking

### (1) Protection tape

① Remove the protection tape from the copier body.

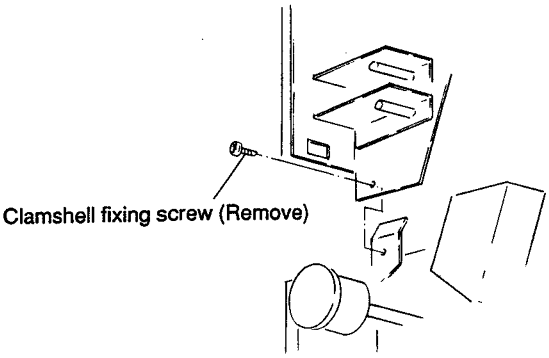

Protection sheet
Protection tape

② Open the front exterior and remove the protection tape from the developer holder unit. Then remove the key (for the key switch) from the open/close lever of the copier body.


Key for the key switch
Protection tape

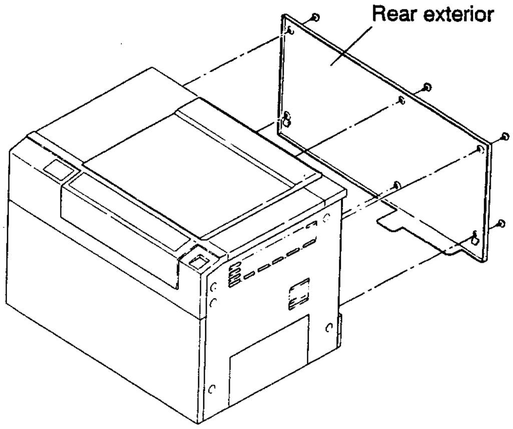
### (2) Releasing the clamshell lock

① Remove the clamshell holding screw on the front frame side.

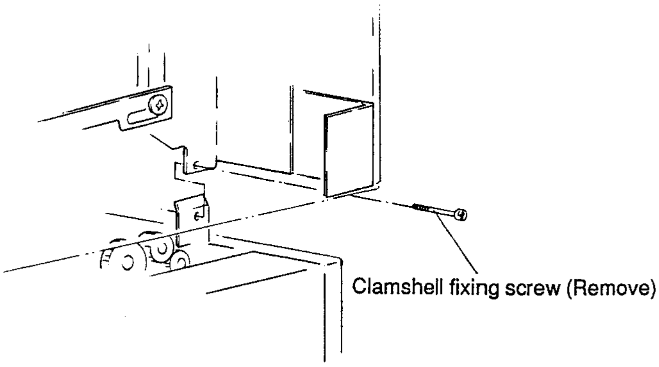

Clamshell fixing screw (Remove)

(Front frame side)

② Remove the rear exterior.


Rear exterior

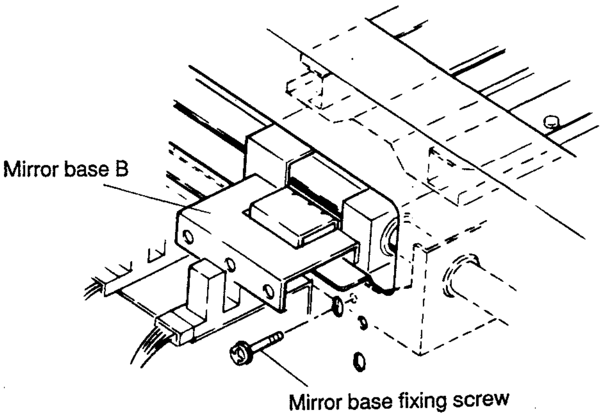
③ Remove the clamshell fixing screw on the rear frame side.


Clamshell fixing screw (Remove)

(Rear frame side)

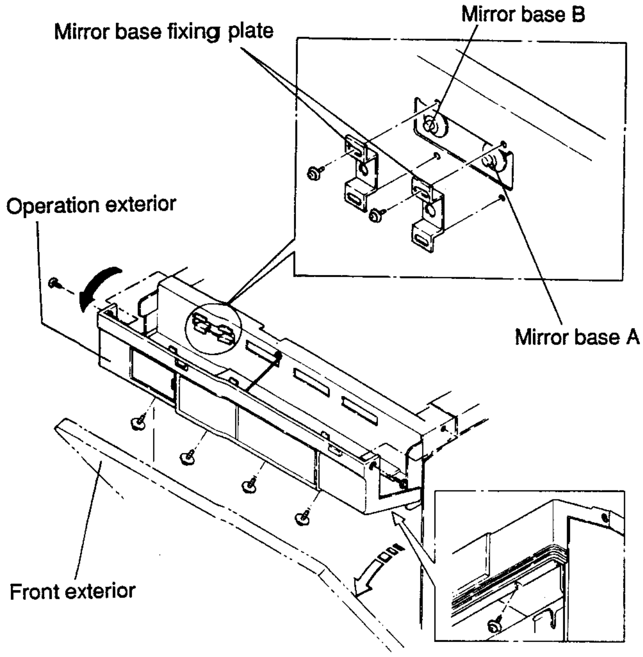
### (3) Releasing the mirror base lock

① Remove the mirror base B fixing screw on the rear frame side.


Mirror base B
Mirror base fixing screw

② Attach the rear exterior.

③ Remove the operation panel holding screws (one each on the paper entry and exit sides, four under the exterior.) Tilt the operation exterior forward.


Mirror base fixing plate
Mirror base B
Operation exterior
Mirror base A
Front exterior

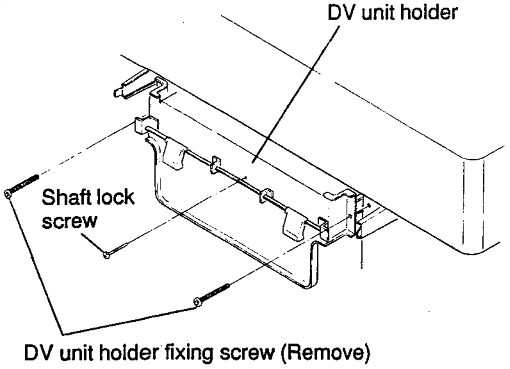
④ Remove the mirror base fixing brackets (4 screws) on the front frame side that are used to secure mirror bases A and B during shipping.

⑤ Close the operation exterior.

## (4) Releasing the developer unit holder lock

① Remove the developer unit holding screws.

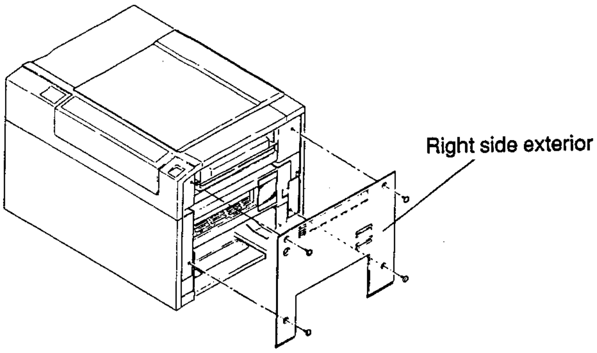
② Remove the shaft lock screw.


DV unit holder
Shaft lock screw
DV unit holder fixing screw (Remove)

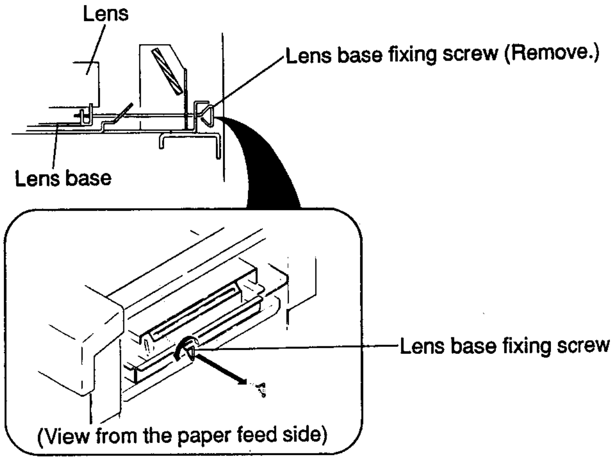
(Note) Use the shaft lock screw when relocating the machine without DV units.

## (5) Releasing the lens base lock

① Remove the right side panel.


Right side exterior

② Remove the lens base fixing screw on the paper entry side.

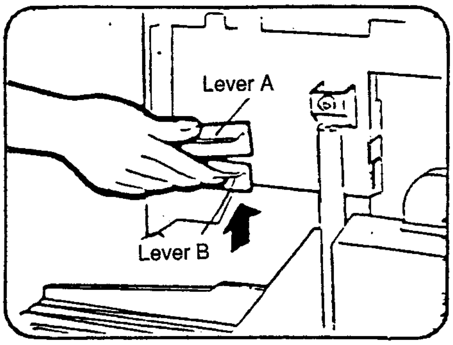

Lens
Lens base fixing screw (Remove.)
Lens base
Lens base fixing screw
(View from the paper feed side)

③ Replace the right side panel.

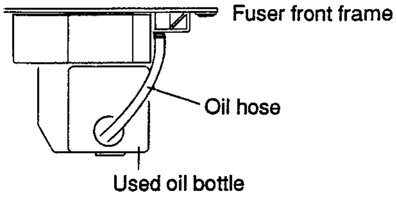
NOTE: To relocate the machine, perform test command 96 to set the lens filters and mirrors to their shipping positions. Turn the power off and replace the lens base fixing screw and mirror base holders.

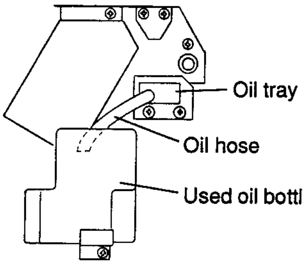
## (6) Fuser heat roller tension

① Open the clamshell.
Hold the clamshell open handles (A, B) at the same time and lift it up until a clicking sound is heard.

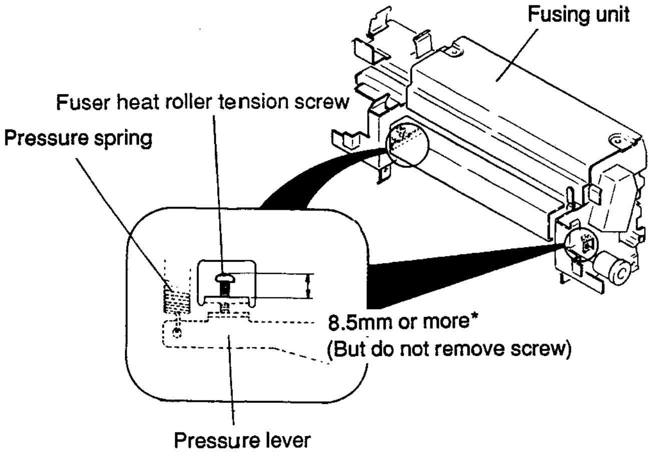

Lever A
Lever B

Check the used oil bottle and hose.
Hole of cap position should be right.

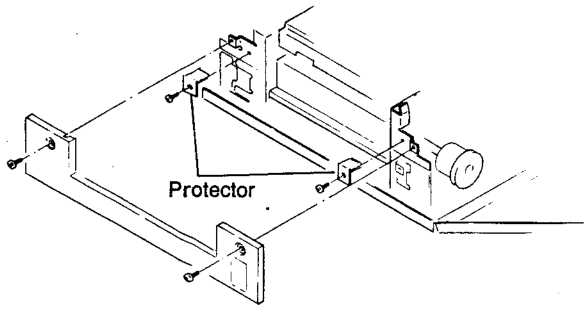

Fuser front frame
Oil hose
Used oil bottle


Oil tray
Oil hose
Used oil bottle

② Loosen the fuser heat roller tension screws until they are each situated as shown in the figure.

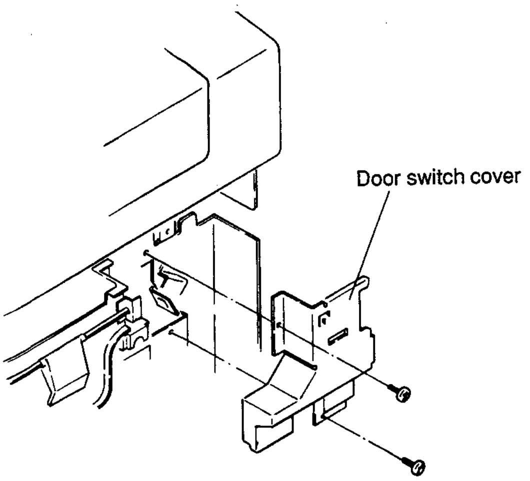

Fusing unit
Fuser heat roller tension screw
Pressure spring
8.5mm or more*
(But do not remove screw)
Pressure lever

## (7) Removing the fuser protector

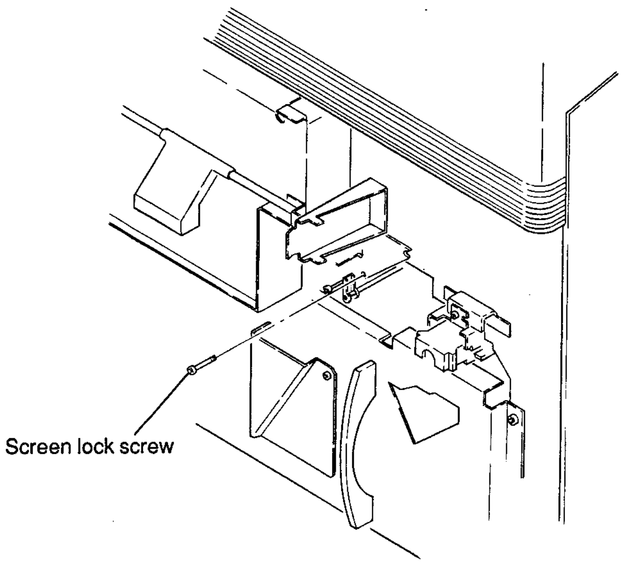


## (8) Screen lock release

① Remove the door switch cover.


Door switch cover

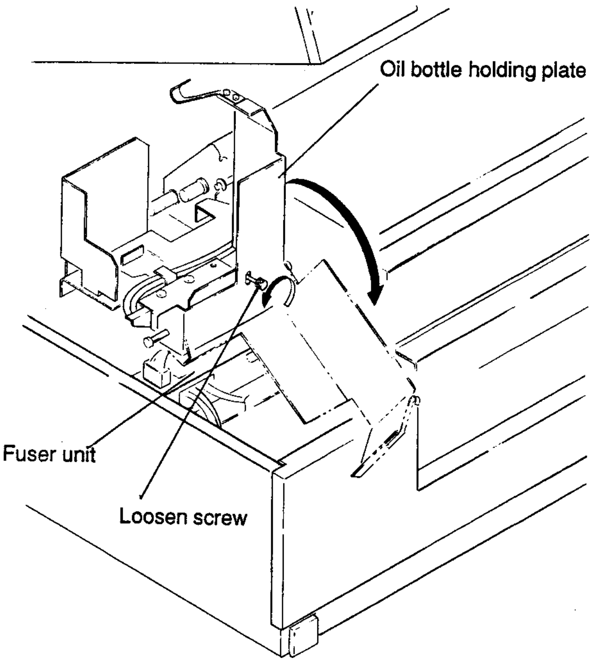
② Remove the screen lock screw.


Screen lock screw

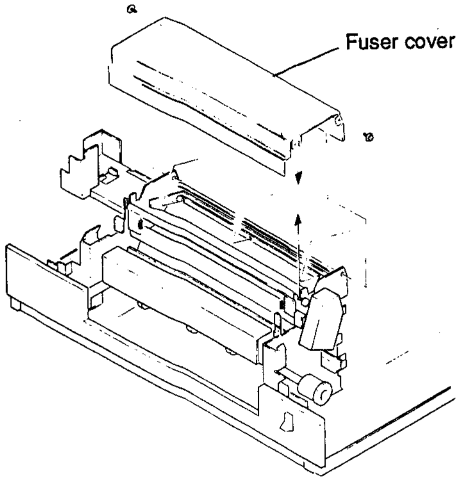
# 4. Installation of supplies parts

## (1) Loading fuser oil

① Loosing the oil bottle holding plate fixing screw and open the holding plate toward the paper exit side.


Oil bottle holding plate
Fuser unit
Loosen screw

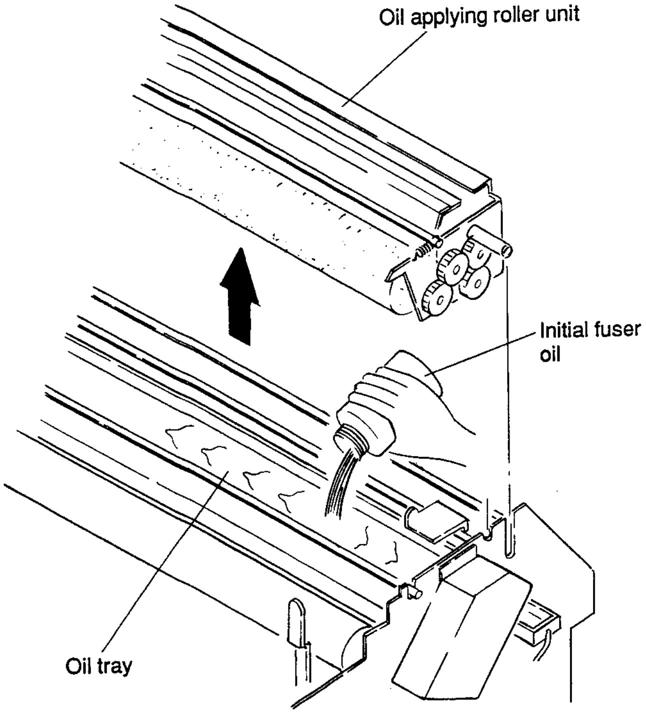
② Remove the fuser cover.


Fuser cover

③ Remove the blue covered screw (Front and Rear).

④ Remove the oil applying roller unit.

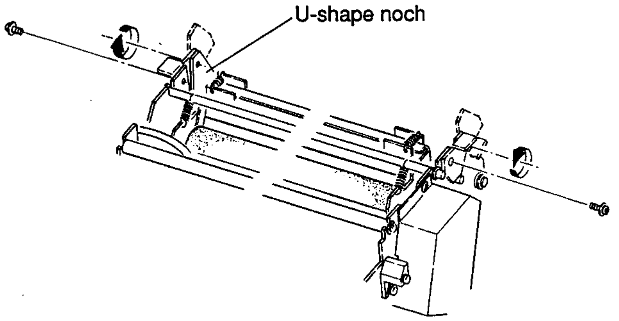
⑤ Pour initial fuser oil bottle (80cc) for installation into the oil tray.


Oil applying roller unit
Initial fuser oil
Oil tray

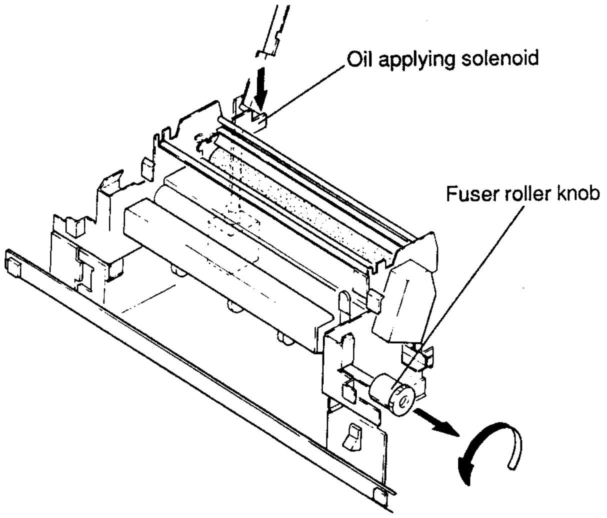
(The bottle can be used for disposed oil when tray is removed.)

⑥ Install the oil applying unit.

⑦ To make sure that the oil frame roller should be installed in the end of "U" cutted fuser frame as shown.


U-shape noch

⑨ Manually turn on the oil applying solenoid. While pulling the fuser roller knob in the arrow direction, turn it 5 ~ 6 turns counterclockwise.

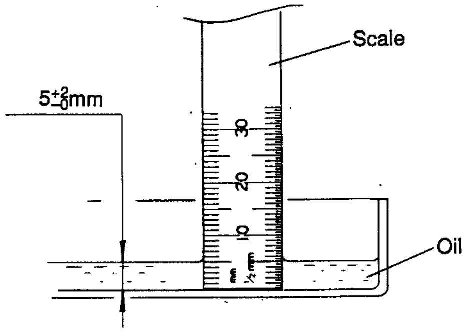

Oil applying solenoid
Fuser roller knob

(Note 1) With this procedure, oil is applied to the fuser roller to reduce friction between the thermistor and the fuser roller.
If this procedure is neglected, the fuser roller may be damaged by the thermistor.

(Note 2) Because of oversupply of oil to the upper heat roller, the first and the second copies may be dirtied with oil.

⑩ Oil level check

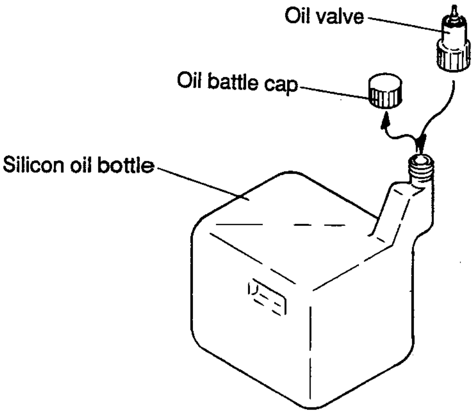
Use a scale to measure oil level at the front and the rear sides. If there is 1 mm or more difference, readjust the level of the machine so that the difference is within 1 mm.


Scale
$5^{+2}_{-0}$mm
30
20
10
mm
½ mm
Oil

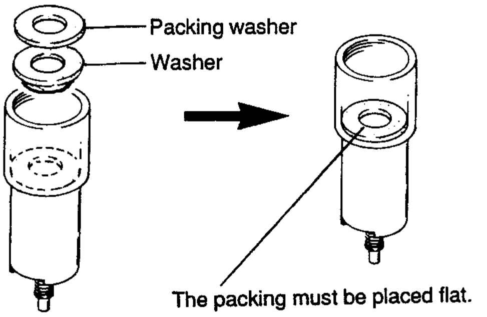
(Note) To readjust the level of the machine, put the installation spacer packed in the carton under the machine.

⑪ Re-attach the fuser cover.

⑫ Remove the fuser oil bottle cap and attach the oil valve.


Oil valve
Oil battle cap
Silicon oil bottle

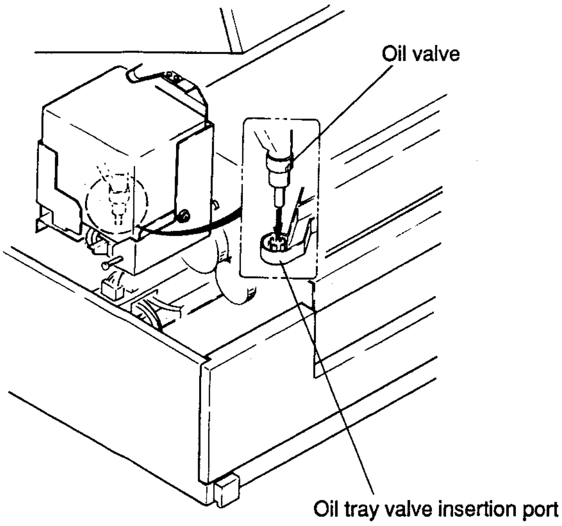
Note: When attaching the oil valve to the bottle, check that the washer and the packing in the valve are placed as shown in the figure. If the installing order of the washer and the packing is improper or the packing is not flat, oil leak may


Packing washer
Washer
The packing must be placed flat.

⑬ Hold the bottle with the oil valve down to check that no oil is leaking and no air is invading the bottle.

⑭ Insert the oil valve into the oil inlet of the oil tray, then install the bottle.

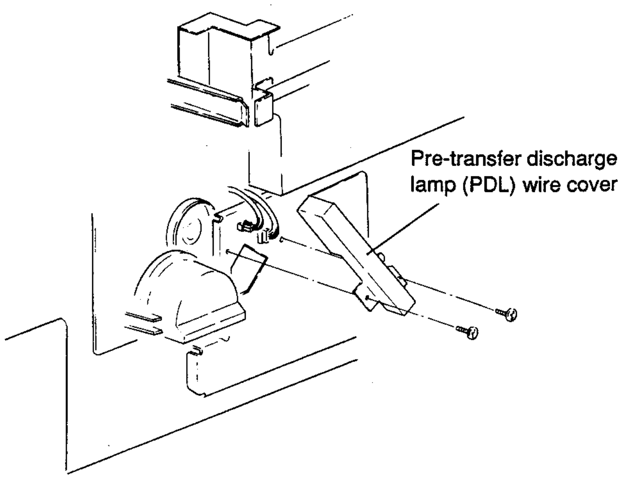
⑮ Fasten the oil bottle bracket with the screw.


Oil valve
Oil tray valve insertion port

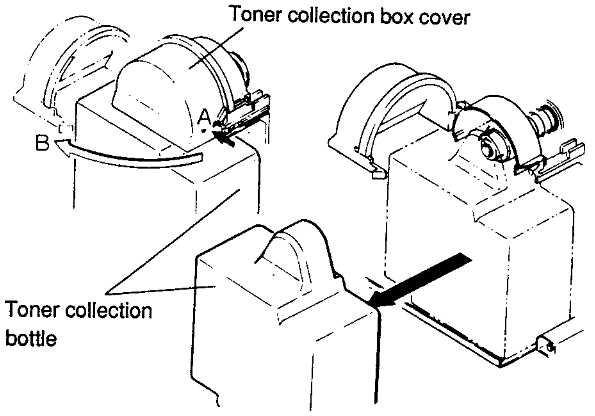
## (2) Installing the photoconductor (PC) belt and transfer (TX) belt

### a. Removing the PC cleaner unit and the TX cleaner unit

① Remove the pre-transfer discharge lamp (PDL) wire cover.

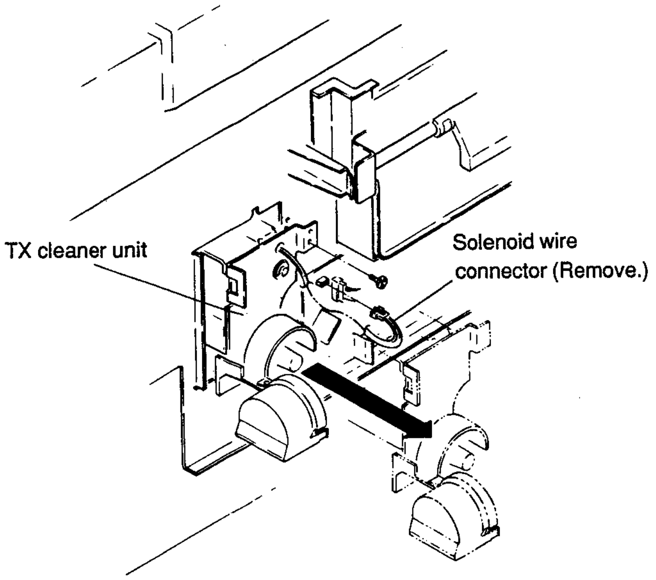

Pre-transfer discharge lamp (PDL) wire cover

② Push the waste toner bottle cover on the TX belt cleaner unit in the arrow direction A, and open it in the arrow direction B, then remove the waste toner bottle.


Toner collection box cover
A
B
Toner collection bottle

③ Unfasten the solenoid wire connector from the machine frame unit.

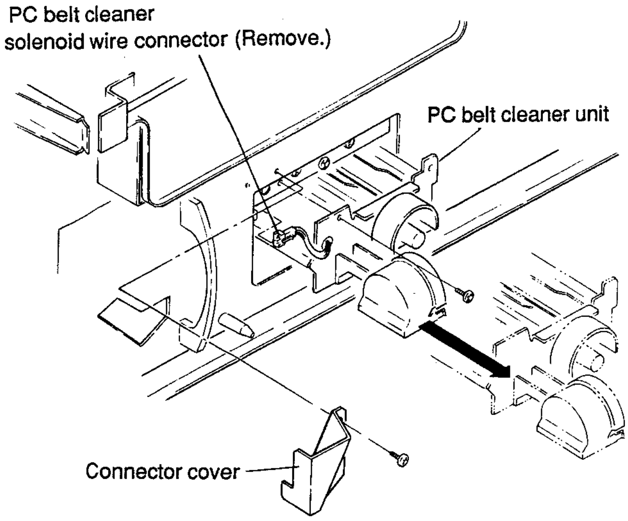
④ Remove the TX cleaner unit holding screw, then pull out the TX belt cleaner unit towards front while supporting it with your hand below.


TX cleaner unit
Solenoid wire connector (Remove.)

⑤ Remove the waste toner bottle of the PC cleaner unit in the same manner as the TX cleaner unit waste toner bottle.

⑥ Remove the PC cleaner unit connector cover, and unfasten the solenoid wire connector.

⑦ Remove the PC cleaner unit holding screw, and pull out the photoconductor belt cleaner unit towards the front while supporting it on your hand below.

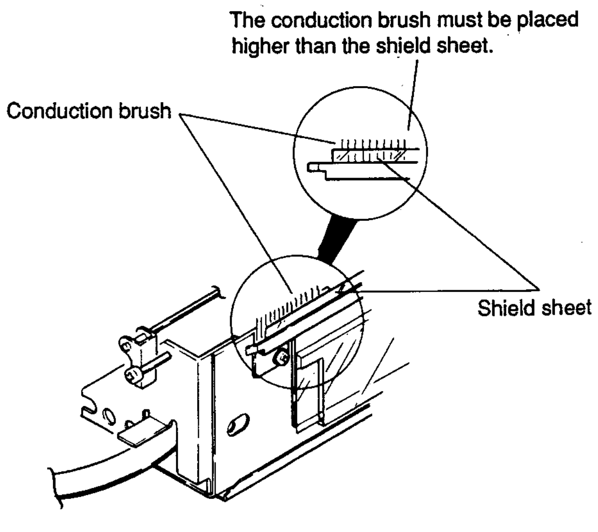

PC belt cleaner solenoid wire connector (Remove.)
PC belt cleaner unit
Connector cover

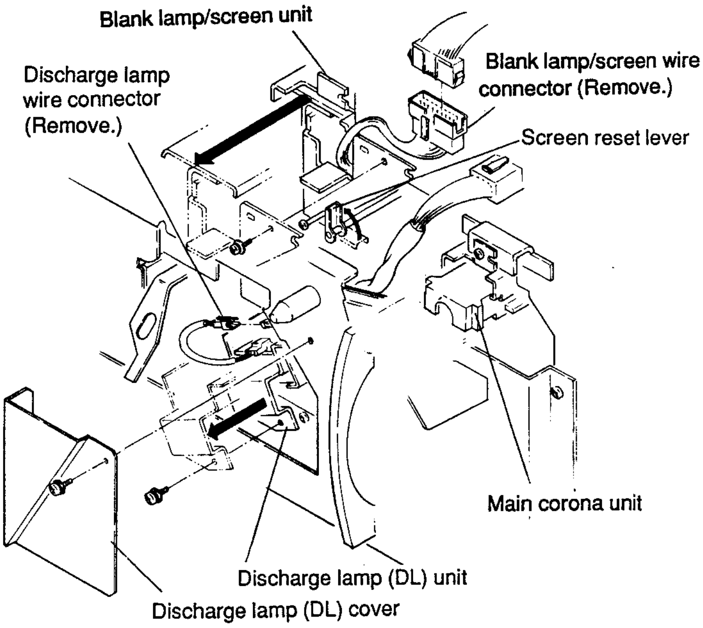
### b. Remove the process unit bracket

① Remove the main corona unit.

② Remove the blank lamp/screen wire connector, then remove the screw and pull out the blank lamp/screen unit towards the front to remove.

(Note)
- Before removing the process unit bracket, reset the screen. (Put the screen reset lever upward.)
- Be careful not to deform the conduction brush and the shield sheet.

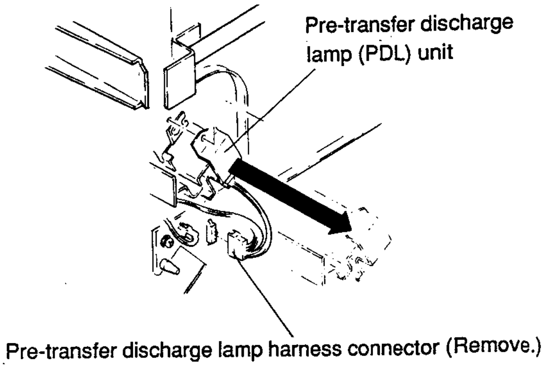

The conduction brush must be placed higher than the shield sheet.
Conduction brush
Shield sheet


Blank lamp/screen unit
Discharge lamp wire connector (Remove.)
Blank lamp/screen wire connector (Remove.)
Screen reset lever
Main corona unit
Discharge lamp (DL) unit
Discharge lamp (DL) cover

③ Remove the discharge lamp (DL) cover.

④ Unfasten the discharge lamp (DL) wire connector, remove the screw, and pull out the discharge lamp unit towards you to remove.

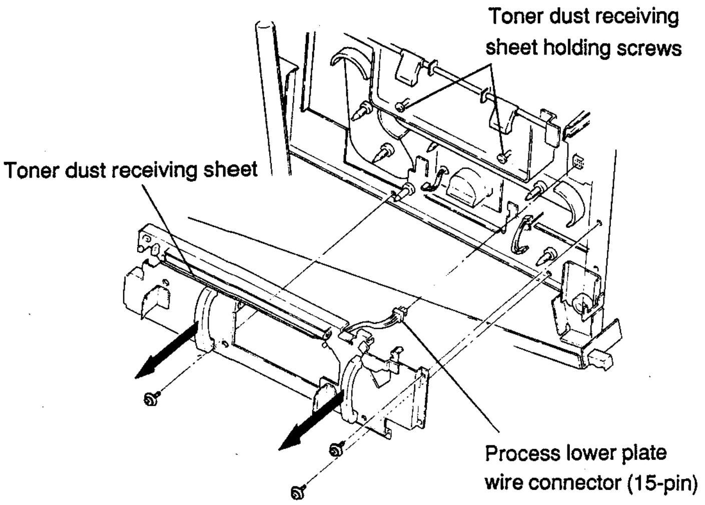
⑤ Unfasten the pre-TX discharge lamp (PDL) unit wire connector and the screw, then pull out the pre-TX discharge lamp unit towards the front to remove.


Pre-transfer discharge lamp (PDL) unit
Pre-transfer discharge lamp harness connector (Remove.)

⑥ Release the toner dust receiving sheet in the process unit side. (2 positions at two screws)

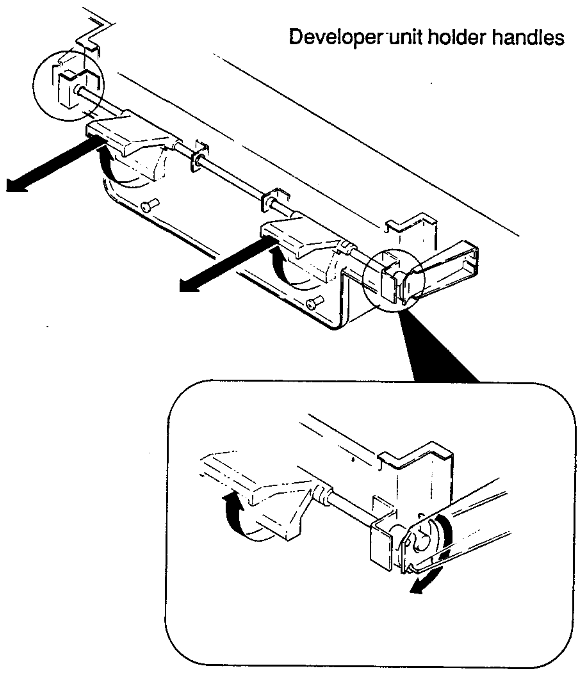
(Note) For the USA model, washers are inserted at the two screws. Remove the two screws to remove the toner dust receiving sheet.

⑦ Unfasten the 15-pin wire connector from the process unit bracket, remove the there process unit bracket holding three screws, then remove the bracket using the handles.

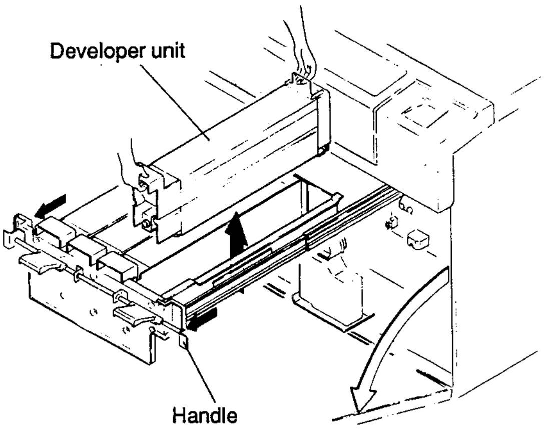

Toner dust receiving sheet holding screws
Toner dust receiving sheet
Process lower plate wire connector (15-pin)

## c. Removing and replacing the developer unit

① Pull up the handles of the developer unit towards the arrowhead and slide out the unit towards the front.


Developer unit holder handles

② Lift up the developer unit to remove it as shown in the figure.


Developer unit
Handle

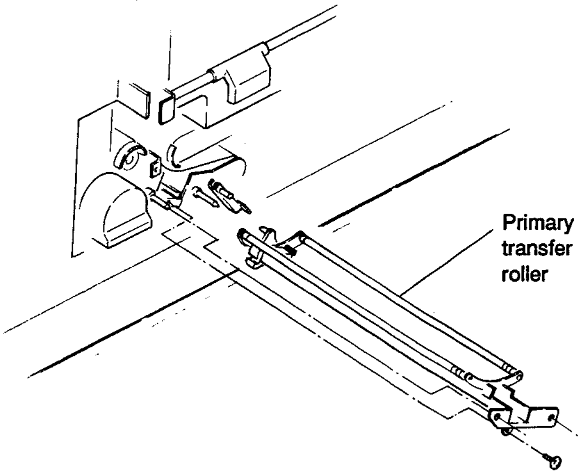
NOTE: Place a sheet of paper on a flat surface and place the developer unit on it after the developer unit removed. This is done to prevent the MG roller from being contaminated with metallic fragments.

NOTE: Remove all developer units at this time.
After removing the protection cover, do not expose it outside the machine for a long time. (Care should be taken to prevent pre-exposure.)

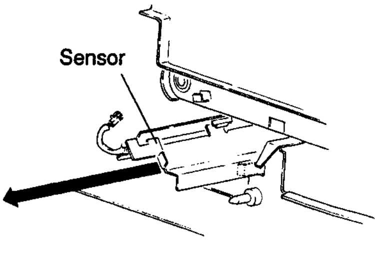
## d. Installing the PC belt

NOTE: Do not expose the belt to strong light.

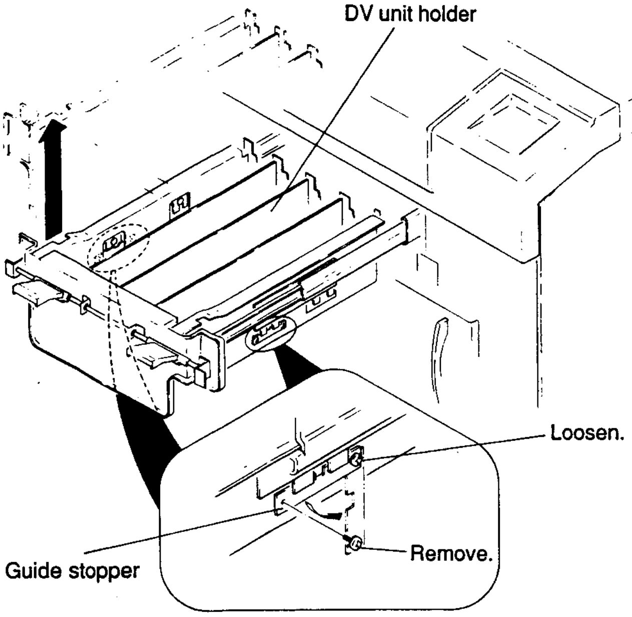
① Remove the primary TX roller.


Primary transfer roller

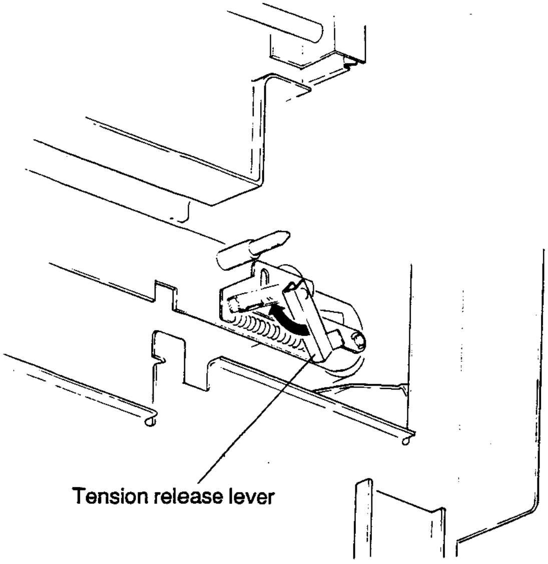
② Remove the gamma sensor.



③ Remove the developing unit holder.


DV unit holder
Loosen.
Remove.
Guide stopper

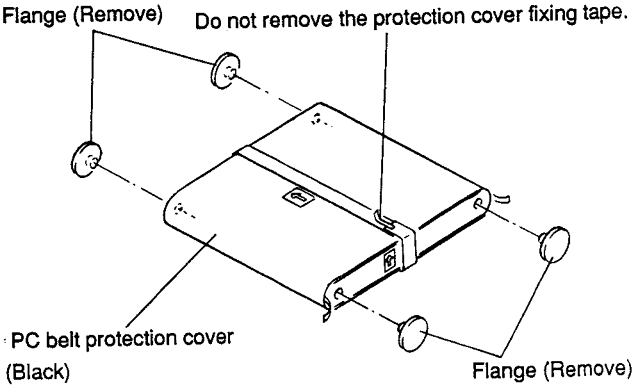
④ Rotate the PC belt tension release lever in the arrow direction (clockwise) to release the tension.


Tension release lever

⑤ Take note of the PC belt sensitivity number printed on the packing case. The first digit of the PC belt serial number represents the sensitivity level.

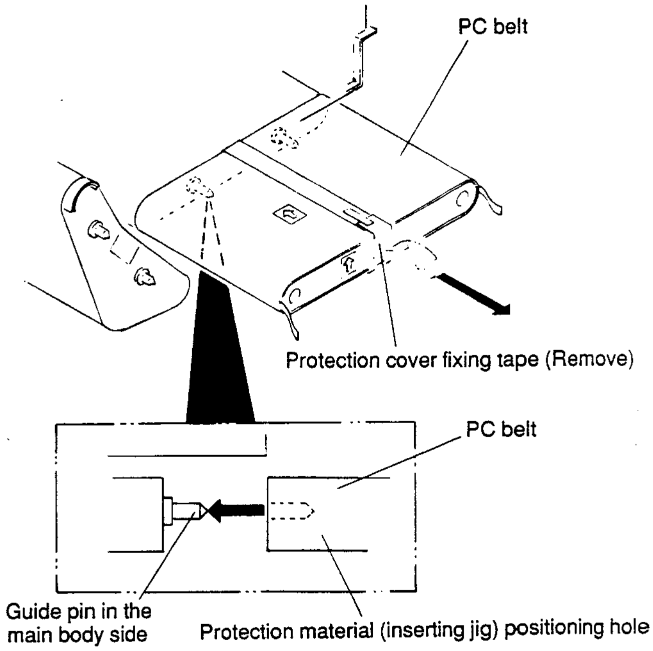
Ex: A serial number with ②K8262B621 represents the sensitivity level "2".
↑ Sensitivity level

⑥ Remove the PC belt from the packing case, then remove the vinyl cover and the flange. The tape on the protection sheet should not be removed, however.

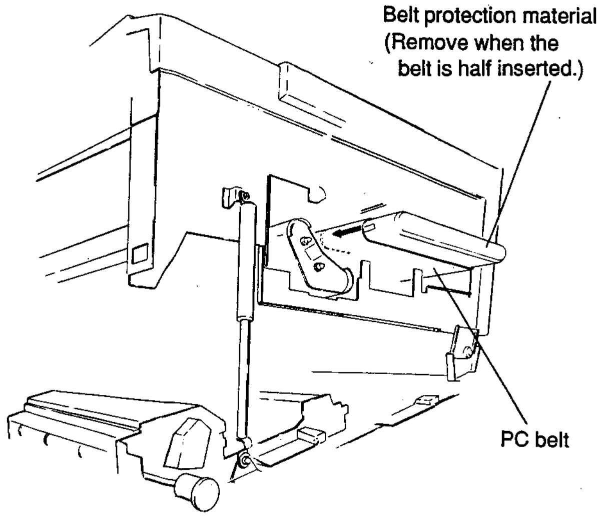

Flange (Remove)
Do not remove the protection cover fixing tape.
PC belt protection cover
(Black)
Flange (Remove)

NOTE: Note the installing direction of the PC belt.
Insert the PC belt so that the index hole side and the carbon-coated side (black) are on the front frame side.

⑦ Insert the PC belt protection material (insertion jig provided with the PC belt) onto the PC belt holder guide pin of the copier, then remove the protection cover fixing tape.

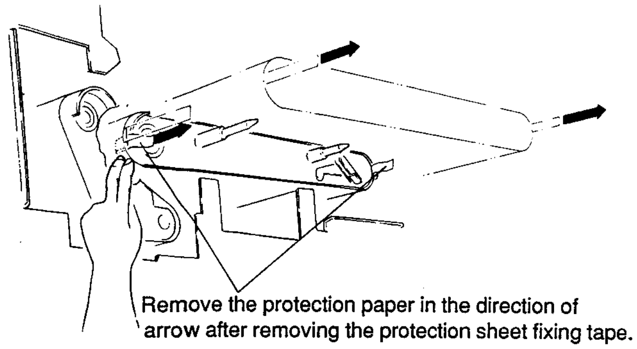

PC belt
Protection cover fixing tape (Remove)
PC belt
Guide pin in the main body side
Protection material (inserting jig) positioning hole

⑧ Slide and insert the PC belt in the arrow direction. When one half of the belt is mounted, remove the protection material. Next, insert the belt all the way in until it hits the belt holder.

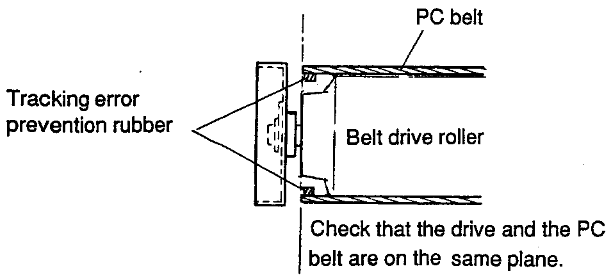

Belt protection material
(Remove when the belt is half inserted.)
PC belt

NOTE: As the PC belt is attached with a black protection sheet, the belt must be mounted together with the protection sheet.

⑨ Lightly press down on the PC belt and peel away the tape on of the black protection sheet. Pull gently in the arrow direction to remove the protection sheet.


Remove the protection paper in the direction of arrow after removing the protection sheet fixing tape.

⑩ Slide the PC belt to adjust it so that the edge of the front frame side PC belt is aligned with the edge of the PC drive roller.


PC belt
Tracking error prevention rubber
Belt drive roller
Check that the drive and the PC belt are on the same plane.

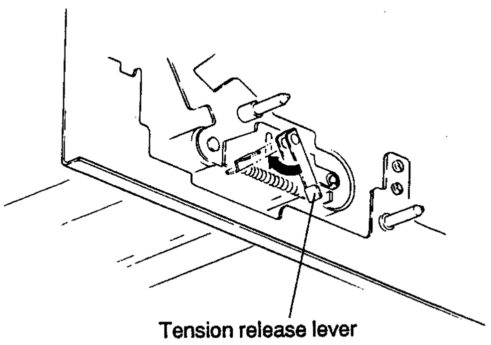
NOTE: Handle the belt with care so as not to stain and damage the PC belt.

⑪ Rotate the PC belt tension release lever counterclockwise to apply tension to the belt.

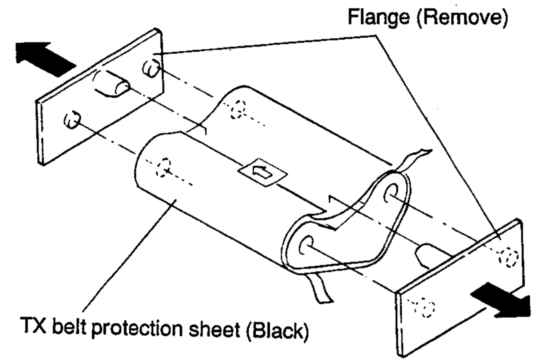
### e. TX belt installation

① After installation of the PC belt.

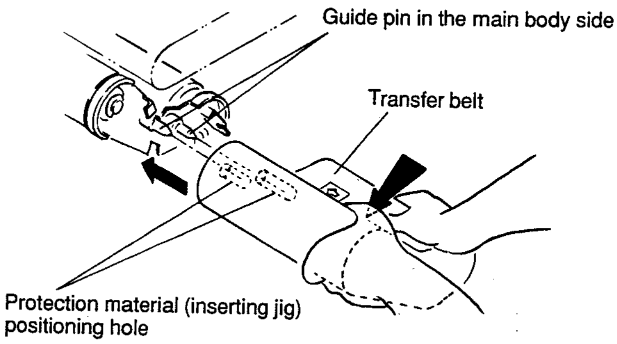
② Turn the TX belt tension release lever 90 degrees in the arrow direction (clockwise) to release the tension.


Tension release lever

③ Remove the TX belt from the packing and remove the vinyl wrapping and flange.

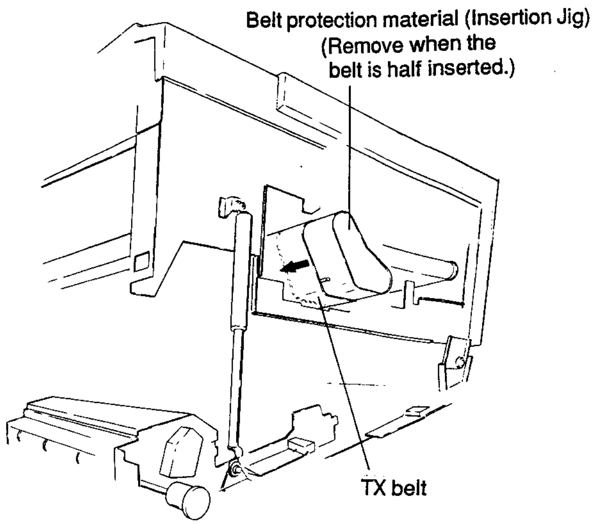

Flange (Remove)
TX belt protection sheet (Black)

④ Align the TX belt protection material (insertion jig is provide with the TX belt) with the TX belt holder guide pin of the copier.


Guide pin in the main body side
Transfer belt
Protection material (inserting jig) positioning hole

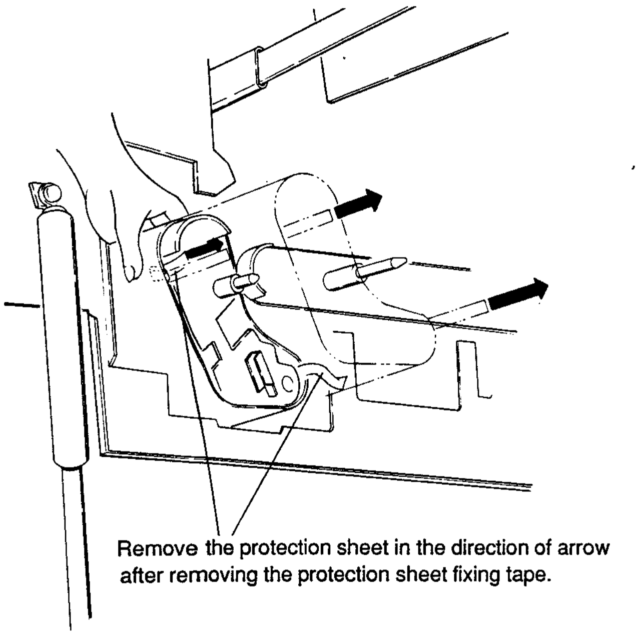
NOTE: Note the installing direction of the TX belt. The side with the index hole must be on the front frame side.

⑤ Slide and insert the TX belt in the arrow direction. When one half of the belt is mounted, remove the protector. Next, insert the belt all the way in until it hits the belt holder.


Belt protection material (Insertion Jig)
(Remove when the belt is half inserted.)
TX belt

NOTE: As the TX belt is attached with a black protection sheet, the belt must be mounted together with the protection sheet.

⑥ Lightly press the TX belt and peel away the taping of the black protection sheet. Slide off the protection sheet in the arrow direction.



Remove the protection sheet in the direction of arrow after removing the protection sheet fixing tape.

(Note) For smooth installation of the TX belt, slide it with slightly rotating in forward and reverse directions. (Perform the same manner for removing the TX belt, too.)

This is because beads are provided at the both sides of the TX belt for prevention against mistracking.

⑦ Slide the TX belt to adjust it so that the edge of the front frame side of the TX belt is aligned with the edge of the transfer drive roller.

NOTE: Handle the belt with care so as not to stain and damage the TX belt.

⑧ Rotate the TX belt tension release lever counterclockwise to apply tension to the belt.

NOTE:
- When the PC belt is installed at the same time with the TX belt, the PC belt must be installed first. The PC belt may not be installed after the TX belt.
- As the PC belt and TX belt protectors (special service tools) are used to install and remove the belt, they should be saved to be used as a service parts after installation has been made.

⑨ Close the clamshell and install the developing unit holder.

⑩ Install the primary transfer roller.

⑪ Install the gamma sensor.

⑫ Position the process unit bracket with three guide pins of the copier (PC belt and TX belt), then secure it with the screws.

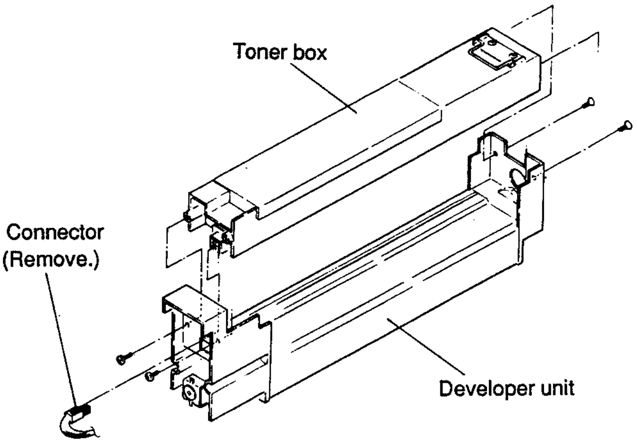
⑬ Connect the 15-pin connector of the process unit bracket to the machine.

⑭ Replace the blank lamp unit (BL), discharge lamp unit (DL), and pre-transfer discharge lamp (PDL).

## (3) Filling the developer

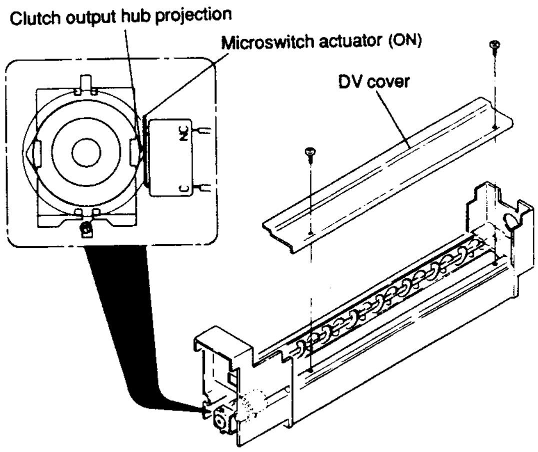
① Unfasten the 9-pin connector on the front frame side of the developer unit.

② Remove two screws securing the toner box on both frame sides, then lift the toner box up to remove.

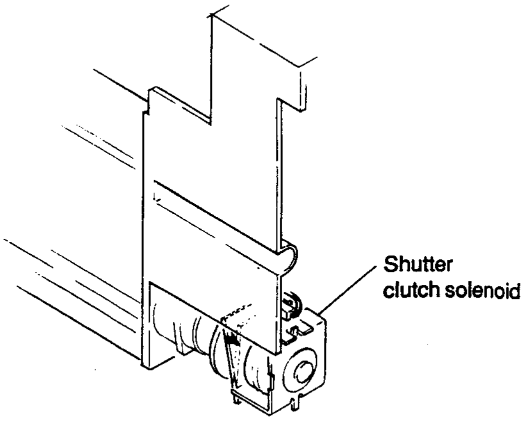


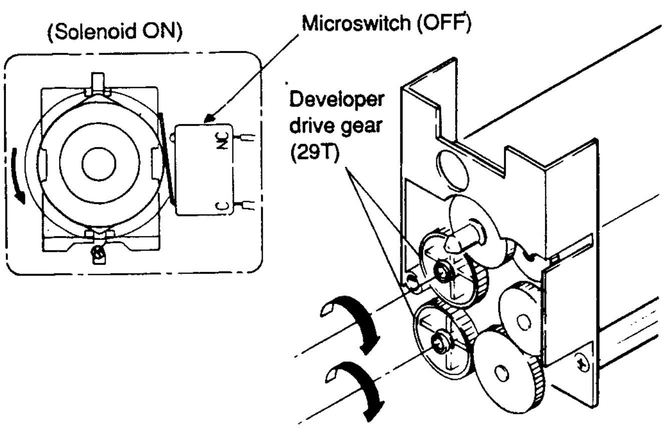
③ Remove the developer unit cover.

④ Make sure that the cam projection on the developer unit front frame side is pushing the shutter open switch actuator to activate the switch.
In this position the shutter connected to the clutch is open.



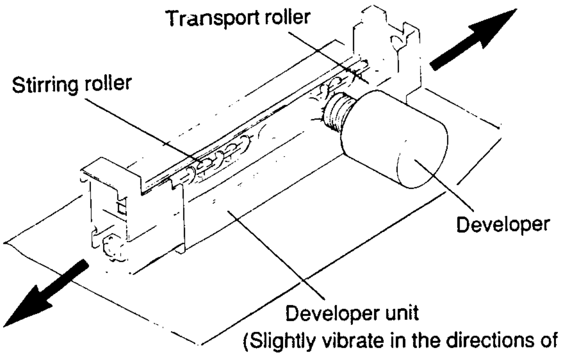
If the cam projection is as illustrated below (microswitch at off), manually activate the developer shutter clutch solenoid and rotate the rear frame side developer roller drive gear (29T) in the arrow direction to adjust so that the cam projection pushes the actuator.




(Solenoid ON)
Microswitch (OFF)
Developer drive gear (29T)
NC
C

(When viewed from the rear frame)

NOTE: Developer may not be fully loaded into the tank if the developer shutter is not open.


Transport roller
Stirring roller
Developer
Developer unit
(Slightly vibrate in the directions of arrows)

⑤ While gently tapping the developer unit, load the developer into the tank.

IMPORTANT: Never try to rotate the developer rollers when loading the developer in the developer tank and before installing the developer loaded tank onto the copier, in order to avoid developer scatter.

⑥ Check to see that developer is not on the developer roller. If the developer unit is installed with developer on the roller, it may cause developer to scatter. If the roller is contaminated with developer, remove the developer from the developer tank in reference to Page 11-4, then do it all over again from step ④.

⑦ Replace the developer unit cover and the toner box on the developer tank.

⑧ Fasten the 9-pin developer tank connector.

⑨ Fill the other color developers (and install them on the developer unit holder) according to steps ① through ⑧.

⑩ Install the main corona in copier. Leave the cleaning unit out of the copier.

## (4) Black toner density sensor sensing level adjustment

### a. General

With this procedure the toner concentration sensor is automatically calibrated to the toner density level of fresh developer by using test command 25, since the toner density (ratio of toner to carrier) of fresh developer is set to a given level for proper copy quality.

### b. Purpose

The purpose of this adjustment is to maintain the toner density at the appropriate level.

### c. When the adjustment is required

- The adjustment is required whenever fresh developer is loaded.

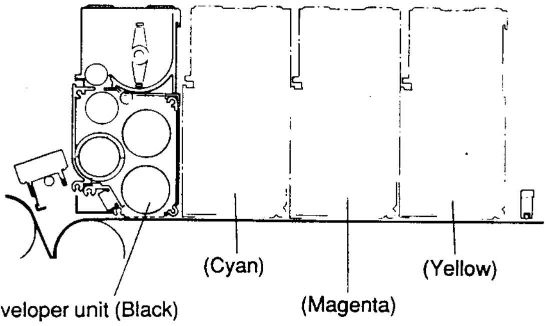
### d. Note

- Never do this adjustment except when the fresh developer is loaded.

### e. Procedure

① Turn on the dip switch ④ on the main PWB (to turn off the gamma correction), then install the four developer units to the developer unit holder.

NOTE: The developer tank units should be installed in the specified position as shown below.
As developer tanks and toner boxes are each a specific color, they must be installed in their given position.
If this procedure is ignored, it may evoke a diagnostic error (blinking SA) prompting for installation or may fail to produce properly colored copies.


(Cyan)
(Yellow)
Developer unit (Black)
(Magenta)

(Viewed from the front frame)

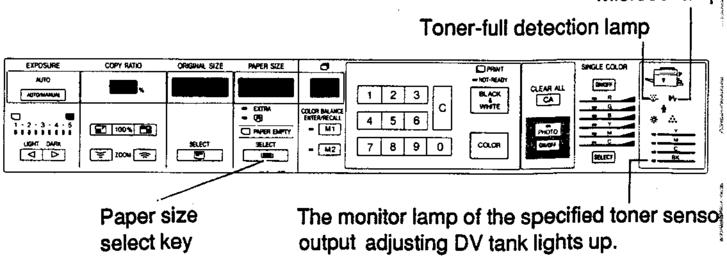
② Insert the developer unit holder.

③ Open the front exterior (front exterior open detector switch off) and turn on the power switch. Perform test command 25.
(Test command 25 key entry)
C → 0 → 0 → C → 2 → 5 → COLOR PSW

④ Close the front exterior open detector switch, and push the COLOR PSW.
(The black developer tank stirring operation will begin with "1" displayed in the copy number window.)

⑤ When the black developer unit is not selected, select the black developer unit by depressing the paper size key. (Adjustment of continuous automatic toner density sensor sensing level) Each depression of the paper size key sequencially selects the yellow, magenta, cyan, and black color.
In test command 25, installation of the developer unit (s) can be monitored on the misfeed and toner full lamps.

When a color developer unit (Y, M, C) is installed, the misfeed lamp lights. When the black developer unit is installed, the toner full lamp lights.


Misfeed lamp
Toner-full detection lamp
EXPOSURE
COPY RATIO
ORIGINAL SIZE
PAPER SIZE
1 2 3
4 5 6
7 8 9 0
C
CLEAR ALL
CA
COLOR
SINGLE COLOR
SELECT
ZOOM
M1
M2
Paper size select key
The monitor lamp of the specified toner senso
output adjusting DV tank lights up.

⑥ Push the COLOR PSW after selecting the developer unit.
The black developer tank begins stirring for a period of two minutes.
During the first minute, the STANDBY lamp will blink. The standby lamp then goes out for the remaining two minutes.
During this time the MONOCHROME indicator lamp will display the shutter open/close position.
Shutter open: MONOCHROME indicator ON
Shutter close: MONOCHROME indicator OFF

⑦ After about 2 min of stirring the developer, toner density is measured every 300ms 16 times and the average value is stored in the backup memory. Then the developer unit shutter is closed. (The toner density sensor level is displayed in the copy quantity display with the number of 0 to 99.)

⑧ Push the CLEAR key once to cancel test command 25 and then go to the next step (5). (Procede test command 37)

## (5) Spreading black toner on the photoconductor belt

### a. Purpose

Before installing the PC belt cleaner unit, toner needs to be spread over the PC belt to abate friction between the belt and the cleaner blade, in order to prevent inversion of the cleaner blade.

### b. When the procedure is required

- After installing a new PC belt cleaner blade.
- After cleaning the PC belt cleaner unit.
- After disassembling the PC belt cleaner unit.

### c. Procedure

Use test command 37, mode 3 for this procedure.

① Execute the test command 37 on the keypad.
C → 0 → 0 → C → 3 → 7 → COLOR PSW

- "1" is displayed in the copy number window.

② Push "3" key.

- "3" is displayed in the copy number window.

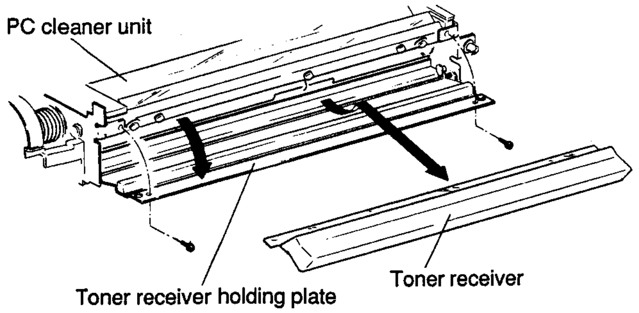
③ Push the COLOR PSW.

- Toner is spread all over the PC belt.

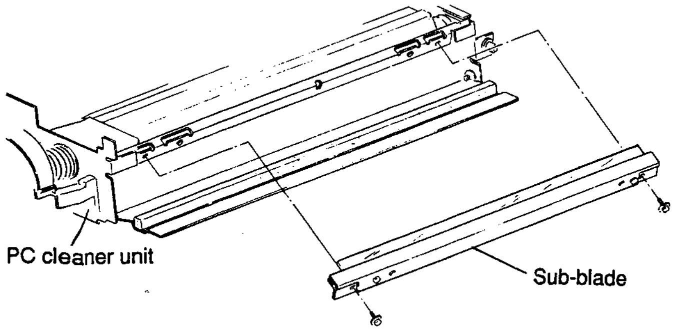
## (6) Installing the photoconductor belt cleaner blade

① Remove two toner receiver fixing screws and tilt the plate downward.

② Remove the toner receiver.


PC cleaner unit
Toner receiver holding plate
Toner receiver

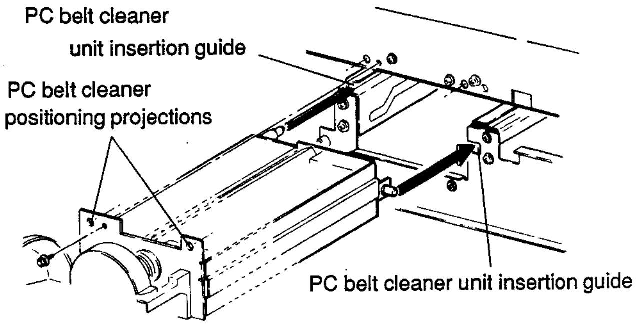
③ Match the blade holding plate studs with the blade positioning holes, then install the sub-blade (Main and Subblade are identical in their structure.)


PC cleaner unit
Sub-blade

NOTE: Do not wipe away white powder on the blade, as it is used to abate friction between the belt and the blade.
Do not scratch the blade surface.

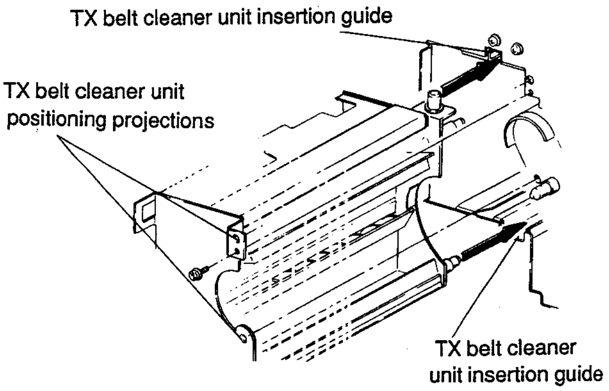
④ Attach the toner receiver to the PC belt cleaner unit, and fix the toner receiver holding plate.

⑤ Insert the PC belt cleaner unit along the guide rails. Rest it on the positioning studs and holes, then secure it with the screw.


PC belt cleaner unit insertion guide
PC belt cleaner positioning projections
PC belt cleaner unit insertion guide

## (7) Installing the TX belt cleaner unit

① Insert the TX belt cleaner unit along the insertion guides. Fit the front frame positioning projections with the aligning holes in the copier body, then secure it with the screw.


TX belt cleaner unit insertion guide
TX belt cleaner unit positioning projections
TX belt cleaner unit insertion guide

② Install the waste toner bottle to the PC and TX belt cleaner units.

## (8) Adjusting the yellow, magenta, and cyan toner density sensor level

① Perform test command 25 referring to "(4) Black toner density sensor sensing level adjustment (page 3-12)".

② Press the paper size select key to select the color (Y, M, C) developer unit. (Continuous automatic toner sensor level adjustment mode)

③ Press the color PSW again.

④ Automatic toner density sensor sensing level is adjusted in the sequence of color developer units Y, M, and C.

### (9) Loading toner

① Slide out the developer unit holder and open the toner box cover using the slide lock.
Move the slide lock in direction of arrow.

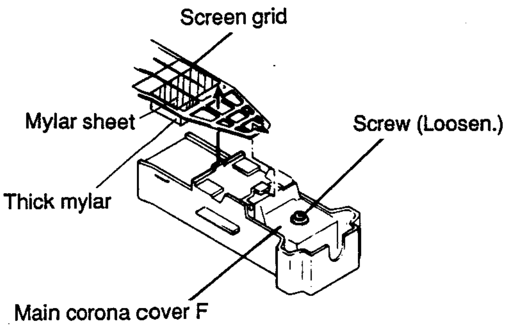
② Gently pour in the appropriate color toner while moving the toner bottle from rear to front.

NOTES: 1. Pour in all four color toners in their specific boxes as there are marks provided on boxes.

2. Note that a toner box can contain 200 grams of the toner. Do not load more than required to prevent overflow.

## 5. Cleaning the main corona unit

① Loosen the screw that secures the main corona cover F and remove the screen grid.



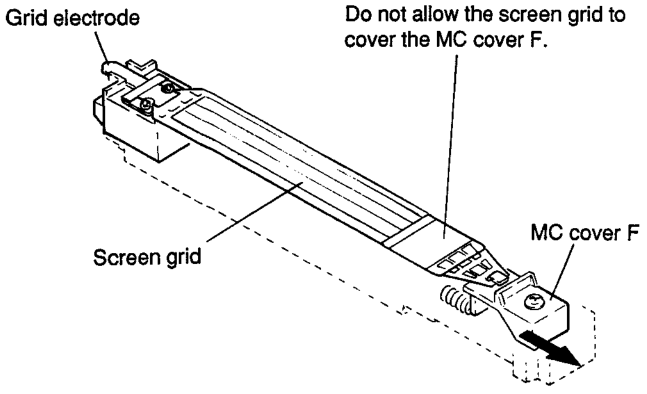
② Clean the main corona wire using the clamp like tool provided or a soft, lint-free cloth dampened with pure isopropyl alcohol (90%).

③ Gently wipe the screen grid with a soft, lint-free cloth dampened with isopropyl alcohol (90%) on both sides. Do this on a flat surface.

NOTE: Do not scratch or bend the screen grid.

④ Hang the screen grid on the grid electrode in the rear frame side, then insert the MC cover F and the screen grid tension spring. Pushing back the MC cover F, hang it on the front hook of the screen grid. Fix the MC cover F with a screw at position where it is pushed back by the screen tension spring.

(The screen grid tension is determined by this spring attached to the MC cover F.)



NOTE: Note the installing direction of the screen grid. The side with the mylar sheet must face the PC belt.

⑤ Replace the main corona unit in the copier.

## 6. Setting the PC belt sensitivity

### (1) General

Note that there are three kinds of PC belts used; each one possessing a specific sensitivity.
With the test command 45, the sensitivity data are entered for the PC belt installed so as to obtain the main corona grid voltage appropriate to that belt.

### (2) Purpose

This procedure is required in order to produce an optimum copy regardless of PC belt sensitivity variation.

### (3) When this procedure is required

- After replacement of the PC belt.
- After replacement of the main PWB.
- After replacement of a RAM chip (IC 144/145) on the main PWB.
- After cancellation of the trouble status U2.
- After installation of the machine.

### (4) Problems due to incomplete setting

- Improper main grid voltage

↓

Improper copy density
Background on copy

### (5) Procedure

① Execute test command 45.
C → 0 → 0 → C → 4 → 5 → COLOR PSW

- The previously stored PC belt sensitivity number is displayed.

② Enter the same figure as the sensitivity number of the PC belt. (The first digit of the PC belt serial number is the number of the PC belt sensitivity.)

(Ex): The PC belt serial number 2K8262B621 has the sensitivity number of "2". The sensitivity number ranges from 1 to 3.

③ Push the COLOR PSW.

- With this, the PC belt sensitivity data are stored in the memory.

④ Push the CLEAR key twice to cancel the test command 45.

## 7. Specification setup

### (1) General

Machine specifications must be set up using the test command 79 and the main PWB dip switch.

### (2) Purpose

This procedure is required in order to set the copier operating modes to specific user requirements, service setups, and power supply conditions.

### (3) When this procedure is required

- After replacement of the main PWB.
- After cancellation of the trouble status U2.
- After replacement of a RAM (IC 144/145) within the main PWB.
- After machine installation.
- After the source voltage has changed.

## (4) Note

- After setting the dip switches on the main PWB, the power switch must be turned OFF and ON to effect the dip switch settings.

## (5) Problem due to incomplete setting

One of the following problems may arise if the specifications are not set properly:
(Specifications set by the test command 79)

- Abnormal fixed copy magnification ratios.
- Improper copy lamp drive voltage and improper copy density.
- Abnormal paper cassette size indication

(Specifications set by the main PWB dip switch)

| SW No. | Problem state |
|---|---|
| 1 | Document size setup fails |
| 4 | Gamma correction function fails which may result in improper color balance, abnormal density, or background. |
| 6 | Abnormal operation panel indication |
| 10 | Photo-mode exposure level correction |

## (6) Specification setup procedure

### a. Specification set by the test command 79

(Specification set by the test command 79)

- Fixed copy magnification ratio
- Copy lamp drive voltage
- Paper cassette size indication
- Default paper cassette selection
- Selection of variable/fixed maintenance preset value

① Execute test command 79.
C → 0 → 0 → C → 7 → 9 → COLOR PSW

- The previously stored number is displayed and the FULL COLOR ready lamp comes active.

② Using the numeric keypad, enter the proper parameter based on the specification setup table.

③ Push the COLOR PSW.

- The specification appropriate to the parameter entered will be stored.

④ Push the CLEAR key twice to cancel test command 79.

(Specification parameters)

| Maintenance preset value | Paper spec. | Destination | Power specification | | Set value |
|---|---|---|---|---|---|
| | | | 100V/ 200V | 50Hz/ 60Hz | |
| Fixed | AB | JAPAN (With B5 cassette) | 100 | 60 | 00 |
| | | | | 50 | 10 |
| | | Outside JAPAN | 100 | 60 | 01 |
| | | | | 50 | 11 |
| | | | 200 | 60 | 05 |
| | | | | 50 | 15 |
| | Inch | SEC (With LT cassette) | 100 | 60 | 02 |
| | | | | 50 | 12 |
| | | | 200 | 60 | 06 |
| | | | | 50 | 16 |
| | | Outside SEC | 100 | 60 | 03 |
| | | | | 50 | 13 |
| | | | 200 | 60 | 07 |
| | | | | 50 | 17 |
| Variable | AB | JAPAN (With B5 cassette) | 100 | 60 | 20 |
| | | | | 50 | 30 |
| | | Outside JAPAN | 100 | 60 | 21 |
| | | | | 50 | 31 |
| | | | 200 | 60 | 25 |
| | | | | 50 | 35 |
| | Inch | SEC (With LT cassette) | 100 | 60 | 22 |
| | | | | 50 | 32 |
| | | | 200 | 60 | 26 |
| | | | | 50 | 36 |
| | | Outside SEC | 100 | 60 | 23 |
| | | | | 50 | 33 |
| | | | 200 | 60 | 27 |
| | | | | 50 | 37 |

**b. Specification setup using the Main PWB dip switch**

① Set up the specification in reference to the list below.

| SW No. | Feature | Switch position | | Functional description |
|---|---|---|---|---|
| | | ON | OFF | |
| 1 | Document size entry feature ON/OFF | OFF | ON | When set to ON, the document size select function is disabled. (Default OFF) |
| 2 | Maintenance, developer counter double/single count selection | Double | Single | When set to ON, the maintenance counter/developer counter counts two after making an A3 (11" x 17") copy. (Default ON) |
| 3 | Total counter double/single count selection | Double | Single | When set to ON, the total counter counts two after making an A3 (11" x 17") copy. (Default ON) |
| 4 | Gamma correction feature ON/OFF | OFF | ON | When set to ON, the gamma correction feature is disabled. (Default OFF) |
| 5 | Developer unit installation detection | Color, black/white, independent | Color, black/white, common | When set to OFF, copy is not enabled unless all color developers (yellow, magenta, cyan, black) are installed. The status CH is evoked.<br>When set to ON, copy is enabled if either color developer units (yellow, magenta, cyan) or a black developer unit are/is installed (full color or black and white copy mode). (Default OFF) |
| 6 | OEM/Sharp mode | OEM spec | Sharp spec | Operation panel mode and key entry mode change. (Default OFF) |
| 7 | | | | (Default ON) |
| 8 | Maintenance lamp display | Turns on to indicate scanner maintenance and flashes to indicate printer maintenance. | Turns ON only for scanner maintenance. | Selects to assign service attendance for the scanner maintenance only or for scanner and printer maintenance. The indicator turns on to prompt for scanner maintenance and flashes to prompt for printer maintenance. (Default ON-Japan/OFF-Ex) |
| 9 | Slide projector spec select | Slide projector spec | | ON in the case of the slide projector. (The slide projector key is valid.) (Default OFF) |
| 10 | Copy lamp voltage correction feature ON/OFF | Acting | OFF | Copy lamp voltage were automatically adjusted by the number of copies with developer life (Default ON) |

② Turn the power switch off and on.

③ Spare part supply's Main PWB may not be the same as machine's dip switch setting. Check dip switch when changing the Main PWB.

## 8. Gamma sensor output level check

① Execute test command 66 and check that the gamma sensor output level is 70±10. (The value is displayed in the copy quantity display.)
If the gamma sensor output level is not 70±10, perform the output level adjustment. (See 10-19.)

## 9. Accessory installation

① Install the paper exit tray in the copier.

② Load copy paper in the cassette and install it in the copier.

## 10. Copy quality adjustment

The copy quality must be adjusted according to the procedure. (See Page 4-1.)

Note: After completion of the copy quality adjustment, turn off the dip switch "4" on the main PWB to turn on the gamma correction feature.

## 11. Gamma reference level initial setup (Test command 60)

### (1) General

When the main corona grid voltage is at DC –200V, and the density in the non-image area on the TX belt is sensed by the gamma sensor and its level is stored in the memory as the reference level.
Gamma correction is done on the basis of this stored reference level. In this way, proper main corona grid voltage is determined for the copy operation.
The setting must be performed for each color of yellow, magenta, and cyan.

(Gamma correction operation)
A drop in the copy density due to developer aging is corrected by changing the main corona grid voltage (photoconductor belt surface potential).
While changing the main corona grid voltage, the output level of the gamma sensor (TX belt non-exposure area toner image density) is compared with the gamma sensor base level. Appropriate main corona grid voltage is established on the basis of the main corona grid voltage when the gamma sensor output level equals the gamma sensor reference level vs. main corona grid voltage when the gamma sensor reference level was set.
The gamma correction takes place during the warmup period after the power is turned on. It may also be done using test command 61, mode 1.

## (2) Purpose

The purpose of this procedure is to properly perform gamma correction. By doing this, the optimum color balance and copy density are obtained as the developer ages.

## (3) When the procedure is required

- When setting up the machine for the first time.
- After developer (yellow, magenta, cyan) is replenished, except for the black developer.
- When the gammer sensor PWB is replaced. (When the sensor PWB is replaced and adjusted, the color developers should be also replaced in general.)

## (4) Note

- Before the entry of the gamma reference level set-up, the gamma sensor PWB must be properly adjusted. (See 10-19)
- Set the gamma reference level only with fresh developer loaded. When replacing developers other than black, be sure to replace all three color developers (yellow, magenta, and cyan) at the same time.
- You must take note of the gamma reference level on the memo paper located on the front exterior.
  The following action is required if the gamma sensor reference level is set without fresh color developer installed:

(Action-1)
Load into the memory the gamma reference levels noted on the memo paper using test command 59.

NOTE: After execution of test command 60 when installation, execute test command 59 to recall the gamma correction reference values and write the values on the label (SER. No. 41 to 43) inside the front cabinet.

(Action-2)
If the gamma reference level is not noted on the memo paper for the color developers already loaded, replace all of the color developers with fresh ones and set the new gamma reference levels making sure to note their gamma reference levels on the memo paper upon completion on test command 60.

## (5) Problems due to improper setup

One of the following problems may occur if the gamma reference levels are not set properly.

Improper main corona grid voltage

↓

Improper copy density
Background in copy
Improper copy color balance

## (6) Procedure

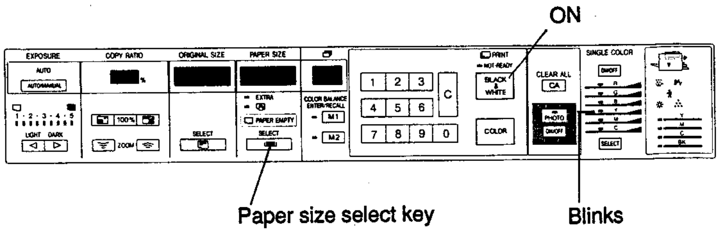
After completion of copy quality adjustment, turn off the dip switch ④ on the main PWB (to turn on the gamma correction feature). Then execute test command 60 to set the gamma sensor reference level.

① Execute test command 60.
(C → 0 → 0 → C → 6 → 0 → COLOR PSW

- The BLACK/WHITE copy ready lamp turns on.

② Select the yellow developer using the PAPER SIZE select key.

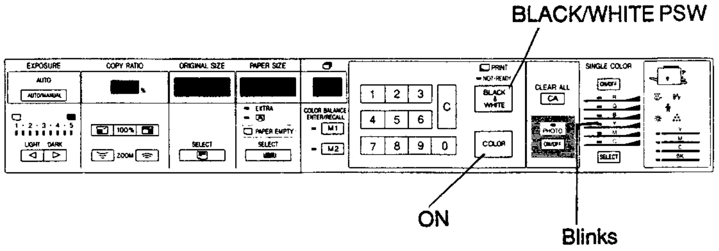
- The YELLOW developer indicator blinks.
  Each time the PAPER SIZE key is pushed, the selected color developer indicator blinks.



③ Push the BLACK/WHITE PSW.

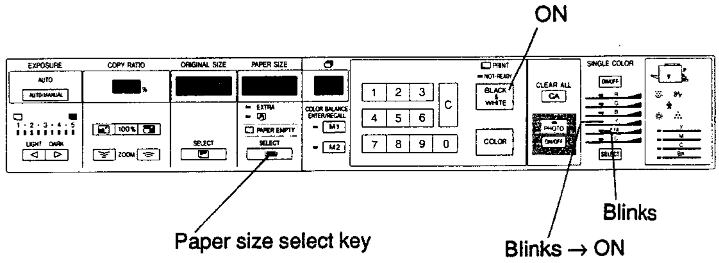
- The COLOR copy ready lamp turns on.

NOTE: If the BLACK/WHITE PSW is depressed again, the yellow developer selection is cancelled and the COLOR copy indicator turns off.



④ Select the magenta color using the PAPER SIZE select key.

- The magenta developer indicator blinks.
- The yellow developer indicator changes from blinking to on.



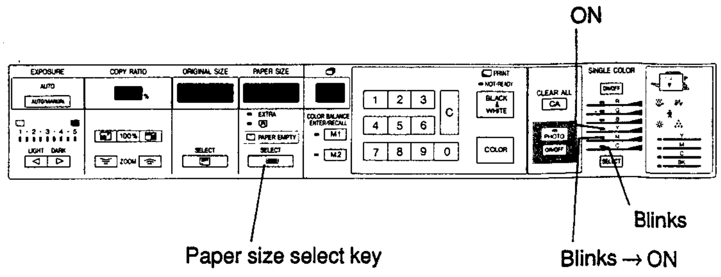
⑤ Push the BLACK/WHITE PSW.

- The COLOR copy ready lamp turns on.

NOTE: If the BLACK/WHITE PSW is depressed again, the magenta developer selection is cancelled and the COLOR copy indicator turns off.

⑥ Select the cyan color using the PAPER SIZE select key.

- The cyan developer indicator blinks.
- The magenta developer indicator changes from blinking to on.



⑦ Push the BLACK/WHITE PSW.

- The COLOR copy ready lamp turns on.

NOTE: If the BLACK/WHITE PSW is depressed again, the cyan developer selection is cancelled and the COLOR copy indicator turns off.

⑧ Depress the COLOR PSW.
(The gamma reference level is set.)
All color developer indicators of yellow, magenta, and cyan are on while the gamma reference levels are being set.
Do not push the CLEAR key or open the exterior or turn power off during this time.

⑨ After the gamma reference levels have been set, note all of the parameters on the memo paper on the front exterior.

NOTE: When the PAPER SIZE select key is pushed in test command 60, the indicator of the selected color blinks.
At the same time, the storred gamma sensor reference level of the selected color (gamma sensor output level for the reference image density level on the TX belt when the main corona grid voltage is at 200V) appears in the copy number window. By using the paper size key, gamma levels can be displayed for each color. Note the displayed level on the memo paper accordingly.

⑩ Push the CLEAR key twice to cancel test command 60.

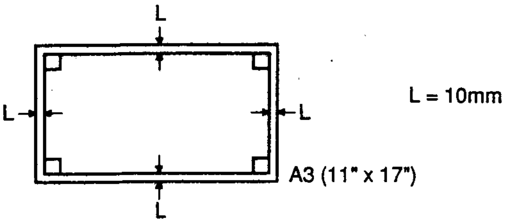
## 12. Copy check

### (1) Image distortion check

### [Checking procedure]

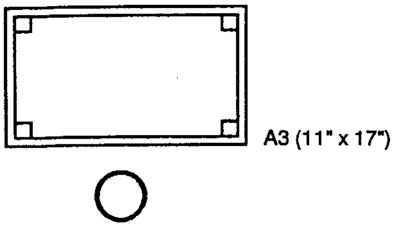
① Make an original document with A3 (11 x 17") paper as shown below:

(Document) Draw a rectangle on A3 (11 x 17") paper as shown below with the four sides parallel to the paper sides. (The four corner angles must be 90°.)

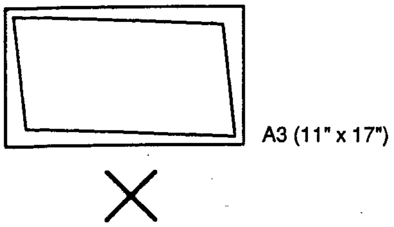


② Make a normal black-and-white copy with A3 (11 x 17") paper, and check if there is any distortion.

(Copy A)



(Copy B)



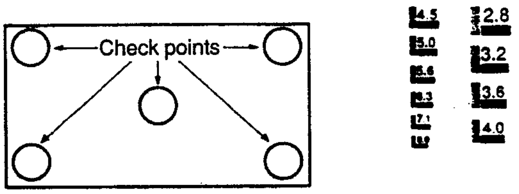
When the four corner angles are 90°, it may be judged that there is no distortion.

Adjust the horizontal image distortion if the distortion is not within specification. (See Page 8-20.)

### (2) Resolution check

Make a black and white copy of optimum density in each of 3 modes with A3 (11 x 17") paper; enlargement (x154%), normal (x100%), and reduction (x64%) and check that the resolutions are within the limits shown in the table below.

(Copy)



| Copy magnification ratio | Resolution (Unit: lines/mm) | |
|---|---|---|
| | Copy center | Corner |
| Normal (100%) | 5.0 | 4.5 |
| Enlargement (101 ~ 154%) | 5.0 | 4.5 |
| Reduction (99 ~ 90%) | 4.5 | 4.5 |
| Reduction (89 ~ 75%) | 3.6 | 3.2 |
| Reduction (74 ~ 64%) | 3.6 | 3.2 |

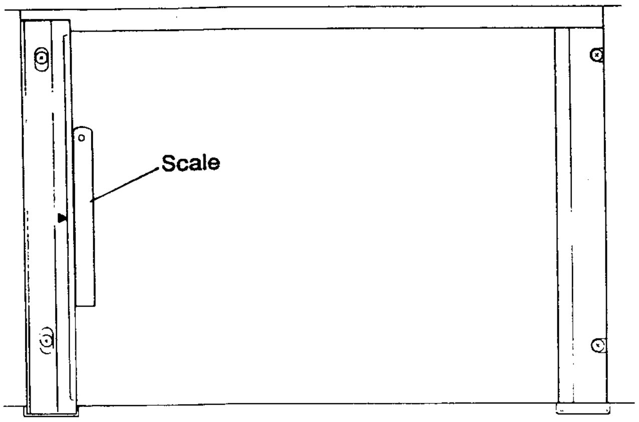
If more than half of the resolution lines are clearly separated, the image is considered resolved (in focus).

If the resolution is not within the limits, the focus must be adjusted. (See Page 8-21.)

## (3) Magnification ratio check

### [Vertical copy magnification ration check]

① Set a scale vertically on the original table. (The longer the scale is, the more accurate the adjustment will be.)



② Set the copy magnification ratio to 100%.

- Copy magnification ratio is displayed as 100%.

③ Make a black-and-white copy with A3 (11" x 17") copy paper.

Vertical copy magnification ration =

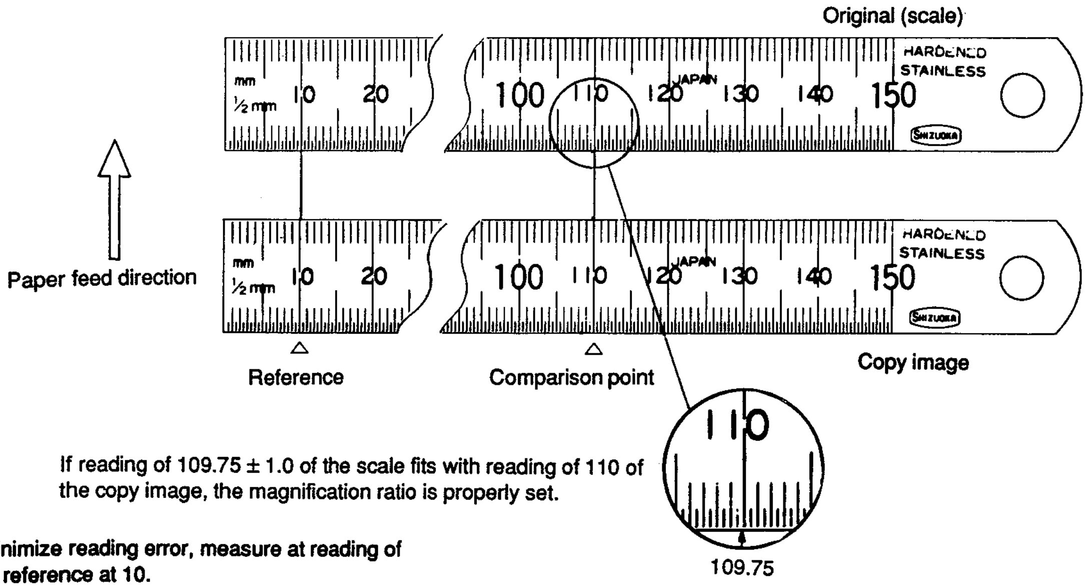
$$\frac{\text{Copy image vertical dimension}}{\text{Original vertical dimension}} \times 100\ [\%]$$

Standard = 99.75 ± 1 [%]

If not within the limits, the vertical copy magnification ratio needs to be adjusted. (See page 8-22.)

(Example: When a 100mm scale is used:)

Measure the length of the copied scale image on the copy paper.

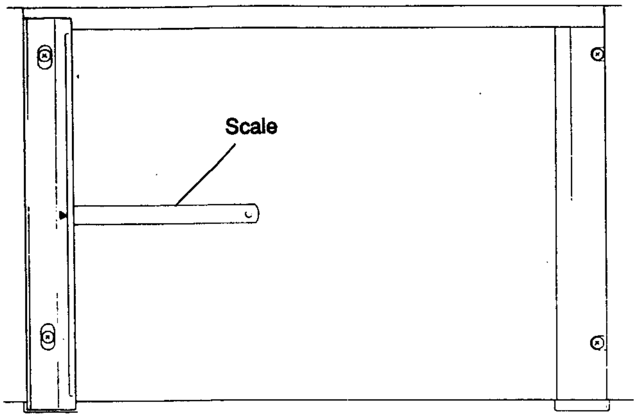

Original (scale)
mm
½mm
10
20
100
110
120
JAPAN
130
140
150
HARDENED
STAINLESS
SHIZUOKA
Paper feed direction
Reference
Comparison point
Copy image
110
109.75

If reading of 109.75 ± 1.0 of the scale fits with reading of 110 of the copy image, the magnification ratio is properly set.

**(Note) To minimize reading error, measure at reading of 110 with the reference at 10.**

**[Horizontal copy magnification ratio check]**

① Set the scale horizontally on the original table as shown in the figure below.
(The longer the scale is, the more accurate the adjustment will be.)



② Set the copy magnification ratio to 100%.

- Copy magnification ratio of 100% is displayed.

③ Make a black-and-white copy with A3 (11" x 17") copy paper.

Horizontal copy magnification ratio =

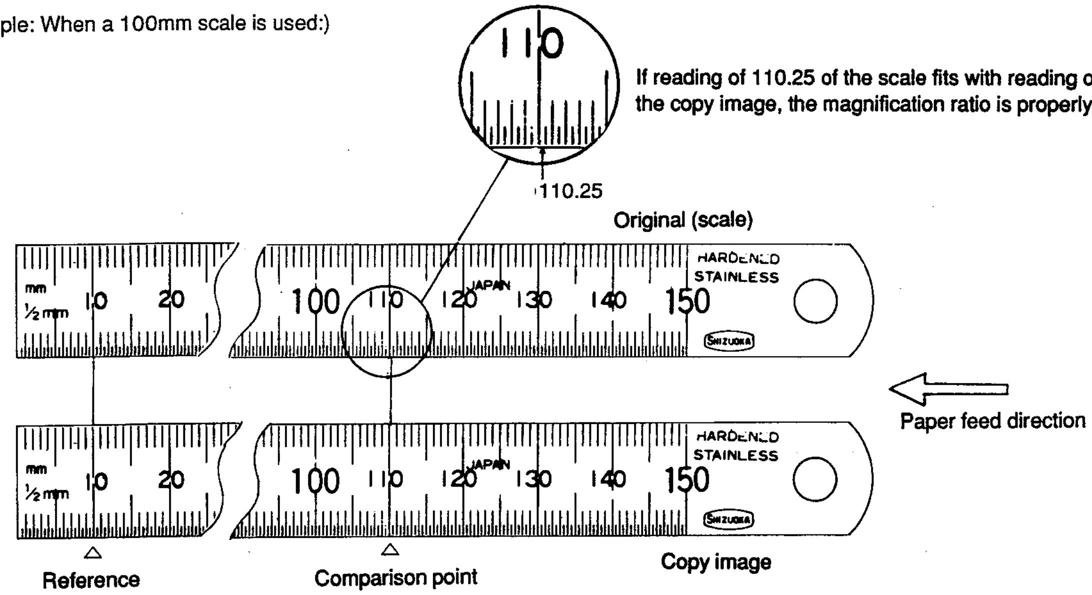
$$\frac{\text{Copy image horizontal dimension}}{\text{Original (scale) horizontal dimension}} \times 100\ [\%]$$

If not within the limits, the horizontal magnification ratio needs to be adjusted. (See page 8-23)

Standard = 100.25 ± 1 [%]

(Example: When a 100mm scale is used:)

(Note) To minimize reading error, measure at reading of 110 with the reference at 10.


110
110.25
Original (scale)
mm
½mm
10
20
100
110
120
JAPAN
130
140
150
HARDENED
STAINLESS
SHIZUOKA
Paper feed direction
Copy image
Reference
Comparison point

If reading of 110.25 of the scale fits with reading of 110 of the copy image, the magnification ratio is properly set.

If not within the limits the horizontal copy magnification ratio need to be adjusted (see paragraph 8-23)

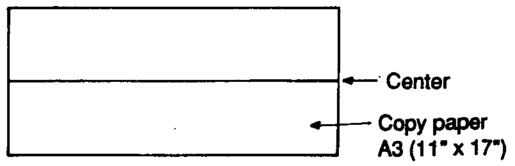
## (4) Center deviation

Make a normal size copy. Check that a copy image deviation is within 2mm of the center of the original image.
If not within the limits, the center position needs to be adjusted. (See page 8-26.)

① Using A3 (11" x 17") copy paper, make an original as shown below:

- Fold the copy paper in two, and draw a line along its center.

(Original)

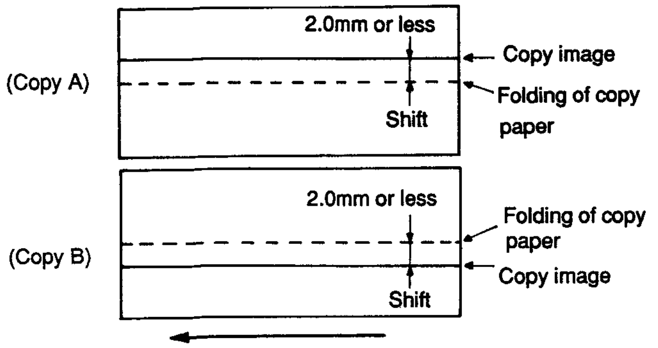

Center
Copy paper
A3 (11" x 17")

② Set the original on the original table aligned with the glass holding plate scale as the reference.

③ Make a normal (100%) black-and-white copy on A3 (11" x 17") copy paper.

④ Check the shift between the original image center position and the copy image center position.

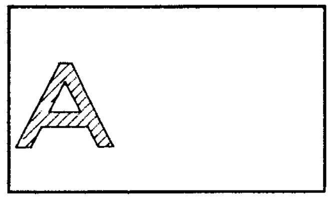
Fold the copy paper in two and measure the dimensional difference between the copy image and the center line of the folded copy paper.


(Copy A)
2.0mm or less
Copy image
Folding of copy paper
Shift
(Copy B)
2.0mm or less
Folding of copy paper
Copy image
Shift

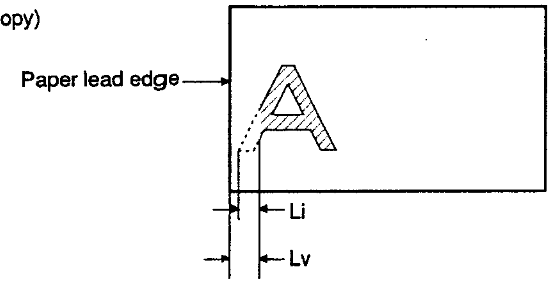
## (5) Lead edge image loss, void area checks

Void area: Area on copy paper where there is not toner.
Image loss: Part of copy image which is not copied.

(Original)



(Copy)


Paper lead edge
Li
Lv

Li: Lead edge image loss
Lv: Lead edge void area
(In some cases, Li ≧ Lv)

### [Checking procedure]

① Set the scale and A3 (11 x 17") white paper on the original table as shown below:

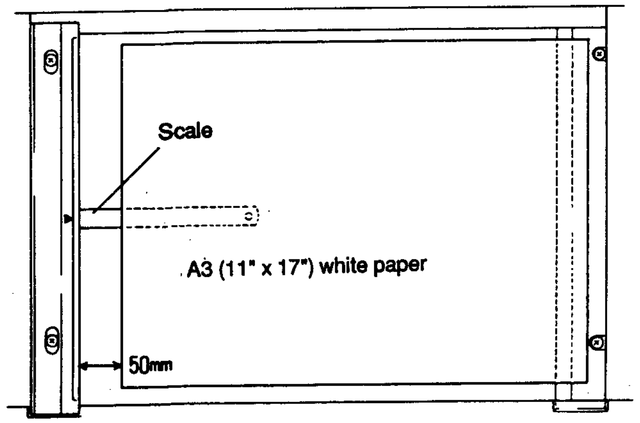
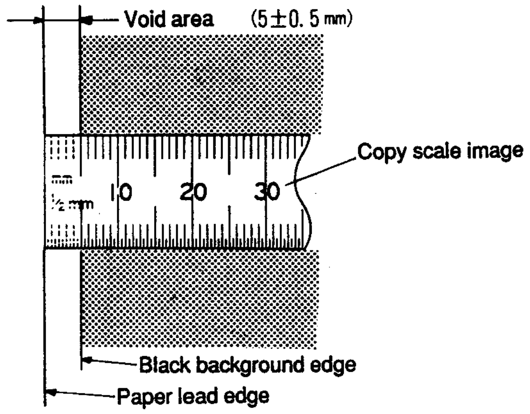

Scale
A3 (11" x 17") white paper
50mm

Image loss (5±1.5mm)


Void area (5±0.5 mm)
Copy scale image
10
20
30
Black background edge
Paper lead edge

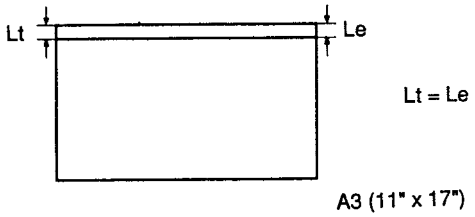
② With the document cover open, make a normal size copy in the black and white copy mode and check that the image loss and the void area are within the limits, listed below.
Lead edge void area: 5±0.5mm
Lead edge image loss 5±1.5mm, max.
If not within the limits, the lead edge image loss and void area need to be adjusted. (See page 8-26.)

## (6) Skew

### [Checking procedure]

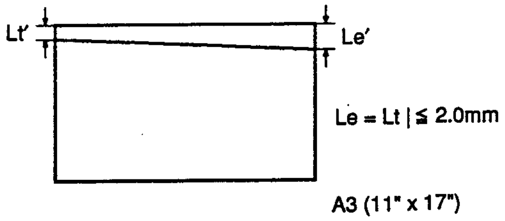
① Make the original as shown below:

(Original) Draw a line parallel to the longer side of A3 (11 x 17") paper.


Lt
Le
Lt = Le
A3 (11" x 17")

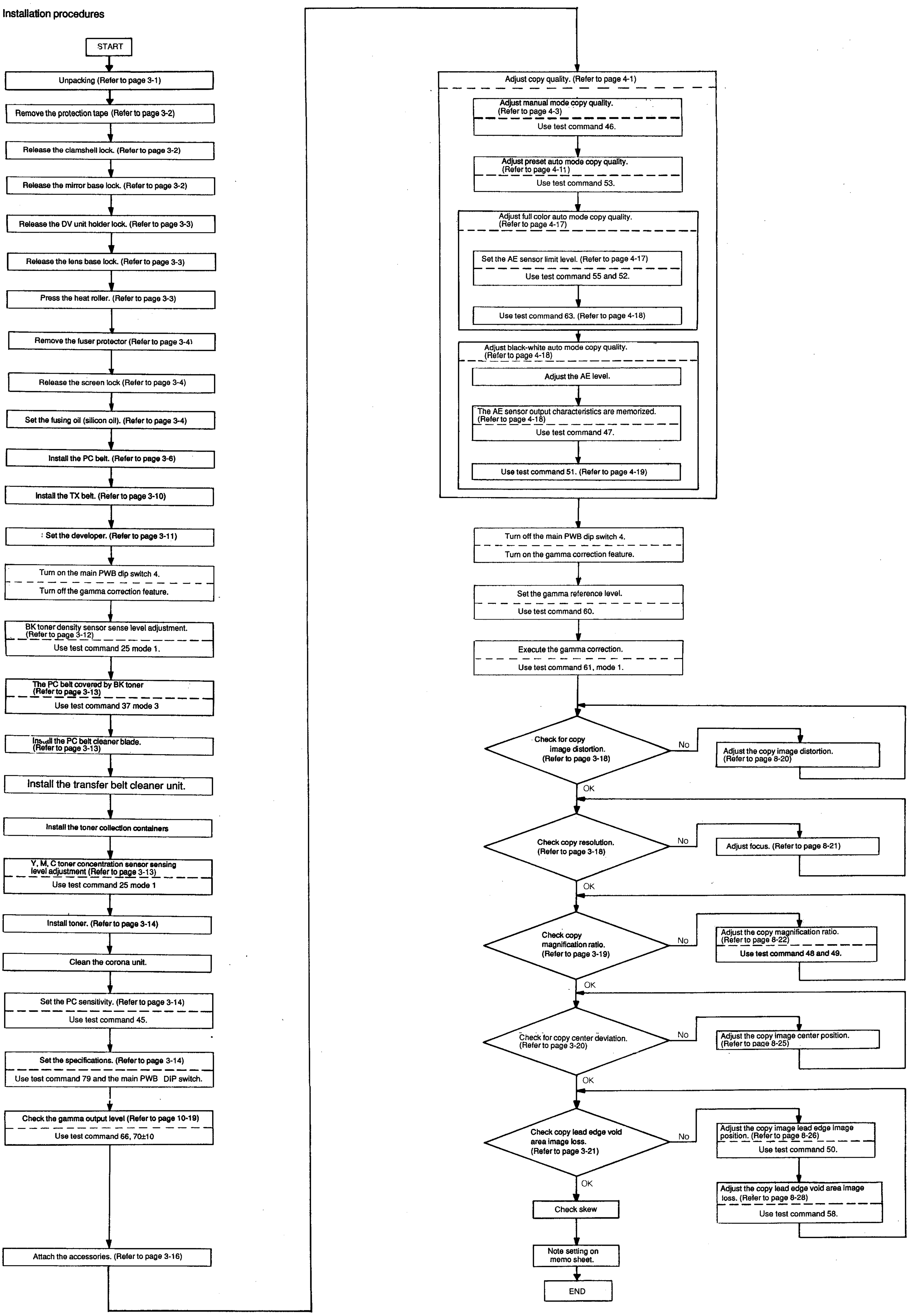
② Make a normal black-and-white copy with A3 (11 x 17") paper. Measure the distance between the paper edge and the copied line at either side.
Check that the difference between the two distances is within 2.0mm.

(Copy)


Lt'
Le'
Le = Lt | ≦ 2.0mm
A3 (11" x 17")

| Paper size | Skew |
|---|---|
| B4 (8 1/2 x 14") or larger | 2mm or less |
| A4 (8 1/2 x 11") or smaller | 1.5mm or greater |

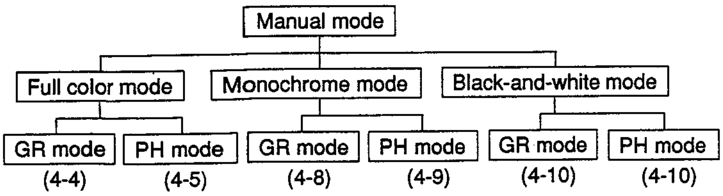
## Installation procedures

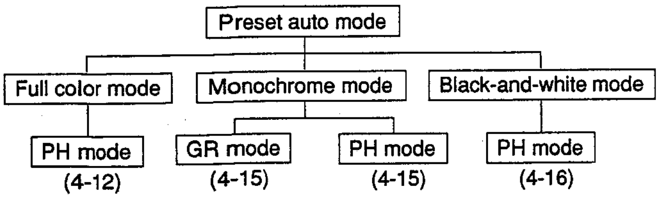

START
Unpacking (Refer to page 3-1)
Remove the protection tape (Refer to page 3-2)
Release the clamshell lock. (Refer to page 3-2)
Release the mirror base lock. (Refer to page 3-2)
Release the DV unit holder lock. (Refer to page 3-3)
Release the lens base lock. (Refer to page 3-3)
Press the heat roller. (Refer to page 3-3)
Remove the fuser protector (Refer to page 3-4)
Release the screen lock (Refer to page 3-4)
Set the fusing oil (silicon oil). (Refer to page 3-4)
Install the PC belt. (Refer to page 3-6)
Install the TX belt. (Refer to page 3-10)
Set the developer. (Refer to page 3-11)
Turn on the main PWB dip switch 4.
Turn off the gamma correction feature.
BK toner density sensor sense level adjustment. (Refer to page 3-12)
Use test command 25 mode 1.
The PC belt covered by BK toner (Refer to page 3-13)
Use test command 37 mode 3
Install the PC belt cleaner blade. (Refer to page 3-13)
Install the transfer belt cleaner unit.
Install the toner collection containers
Y, M, C toner concentration sensor sensing level adjustment (Refer to page 3-13)
Use test command 25 mode 1
Install toner. (Refer to page 3-14)
Clean the corona unit.
Set the PC sensitivity. (Refer to page 3-14)
Use test command 45.
Set the specifications. (Refer to page 3-14)
Use test command 79 and the main PWB DIP switch.
Check the gamma output level (Refer to page 10-19)
Use test command 66, 70±10
Attach the accessories. (Refer to page 3-16)
Adjust copy quality. (Refer to page 4-1)
Adjust manual mode copy quality. (Refer to page 4-3)
Use test command 46.
Adjust preset auto mode copy quality. (Refer to page 4-11)
Use test command 53.
Adjust full color auto mode copy quality. (Refer to page 4-17)
Set the AE sensor limit level. (Refer to page 4-17)
Use test command 55 and 52.
Use test command 63. (Refer to page 4-18)
Adjust black-white auto mode copy quality. (Refer to page 4-18)
Adjust the AE level.
The AE sensor output characteristics are memorized. (Refer to page 4-18)
Use test command 47.
Use test command 51. (Refer to page 4-19)
Turn off the main PWB dip switch 4.
Turn on the gamma correction feature.
Set the gamma reference level.
Use test command 60.
Execute the gamma correction.
Use test command 61, mode 1.
Check for copy image distortion. (Refer to page 3-18)
No
Adjust the copy image distortion. (Refer to page 8-20)
OK
Check copy resolution. (Refer to page 3-18)
No
Adjust focus. (Refer to page 8-21)
OK
Check copy magnification ratio. (Refer to page 3-19)
No
Adjust the copy magnification ratio. (Refer to page 8-22)
Use test command 48 and 49.
OK
Check for copy center deviation. (Refer to page 3-20)
No
Adjust the copy image center position. (Refer to page 8-25)
OK
Check copy lead edge void area image loss. (Refer to page 3-21)
No
Adjust the copy image lead edge image position. (Refer to page 8-26)
Use test command 50.
Adjust the copy lead edge void area image loss. (Refer to page 8-28)
Use test command 58.
OK
Check skew
Note setting on memo sheet.
END

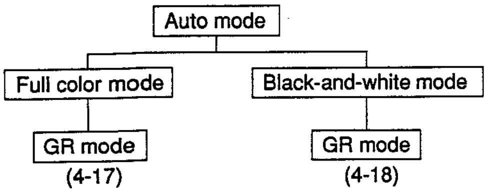
# [4] COPY QUALITY ADJUSTMENTS

## 1. General

- Copy quality adjustments are made by varying the exposure voltage (the copy lamp applying voltage) and the PC belt surface voltage to obtain copy of proper density, proper color balance, and proper contrast.
- There are twelve copy modes as shown below, and copy quality must be adjusted in each mode. Adjustments in each mode can be made separately.
- The graphic mode copy quality is adjusted during use by varying the exposure (copy lamp drive voltage), and the photo mode copy quality is adjusted by varying the PC surface voltage (main corona grid voltage).


Manual mode
Full color mode
Monochrome mode
Black-and-white mode
GR mode
(4-4)
PH mode
(4-5)
GR mode
(4-8)
PH mode
(4-9)
GR mode
(4-10)
PH mode
(4-10)


Preset auto mode
Full color mode
Monochrome mode
Black-and-white mode
PH mode
(4-12)
GR mode
(4-15)
PH mode
(4-15)
PH mode
(4-16)


Auto mode
Full color mode
Black-and-white mode
GR mode
(4-17)
GR mode
(4-18)

GR: Graphic
PH: Photo

(  ): Reference page

## 2. Purpose

The purpose of the copy quality adjustments is to obtain proper copy density, proper color balance, and proper contrast.

## 3. When copy quality must be adjusted

Copy quality must be adjusted in the following cases:

① When the machine is installed.
② When maintenance is performed.
③ When the developer is replaced.
④ When any one of the optical system parts (copy lamp, reflector, filter, etc.) is replaced.
⑤ When the optical system is disassembled.
⑥ When the AE sensor is replaced. (*1)
⑦ When the AE sensor output characteristics are memorized. (*2)
⑧ When the main PWB is replaced. (*3)
⑨ When RAM (IC 144, 145) in the main PWB is replaced. (*3)
⑩ When status U2 is cancelled. (*3)
⑪ When uniformity is adjusted.
⑫ When the slave PWB is replaced. (*1)
⑬ When RAM (IC 216) in the slave PWB is replaced. (*1)

*1: Adjustments must be made only for the auto copy mode.

*2: Adjustments must be made only for the black-and-white auto copy mode.

*3: Execute only test command 47 (AE sensor output characteristics memory). No other adjustments are required if all the set values of test commands 46, 53, 63, 51, and 52 are memorized and the values are set with test command 59.

## 4. Note

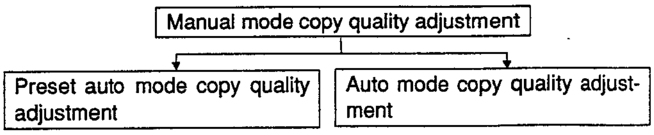
### A. Note for copy quality adjustment

(1) The following items must be performed before copy quality adjustment. If not, proper copy quality cannot be obtained even though copy quality adjustments are made.
① Main corona grid voltage adjustment
② Primary transfer roller voltage adjustment
③ Secondary transfer roller voltage adjustment
④ DV bias voltage adjustment
⑤ CLC PWB adjustment
⑥ PC belt sensitivity adjustment
⑦ Toner density sensor sensing level adjustment
⑧ Gamma sensor PWB adjustment
⑨ Gamma reference level setting
⑩ Uniformity adjustment
⑪ AE sensor output level adjustment
⑫ AE sensor output characteristics memory
⑬ AE sensor limit level setting
⑭ Gamma correction

(2) Be sure to note the set values concerning the copy quality adjustment on the memo sheet pasted inside the front exterior. (The set values must be entered with test command 59 when self diagnosis U2 is eliminated, or when the main PWB or RAM (IC144, 145) on the main PWB is replaced.

### B. Sequence of copy quality adjustments

Copy quality adjustments should be performed in the following sequence.


Manual mode copy quality adjustment
Preset auto mode copy quality adjustment
Auto mode copy quality adjustment

Manual mode copy quality adjustment provides the basis of copy quality for preset auto mode and auto mode adjustments.
Therefore, manual mode copy quality should be adjusted before adjusting preset auto mode and auto mode copy quality adjustments.
When manual mode copy quality is adjusted, the preset auto mode copy quality and auto mode copy quality are also changed. Therefore, after adjusting the manual mode copy quality, preset auto mode copy quality and auto mode copy quality should be also adjusted. If the adjustments are made in improper sequence, normal copy quality cannot be obtained.

### C. Relationship between copy quality in manual mode and that in preset auto mode in and the auto mode

| Mode | Full color mode | Monochrome mode | Black-and-white mode |
|---|---|---|---|
| Manual mode | GR mode PH mode | GR mode PH mode | GR mode PH mode |
| Preset auto mode | PH mode | GR mode PH mode | PH mode |
| Auto mode | GR mode | | GR mode |

Copy quality in manual mode is related to preset auto mode and auto mode. Therefore, when copy quality in manual mode is adjusted, the related copy quality adjustment (shown with arrow in the above table) should be made. The other adjustments than the related adjustment are not required.

(Example) When copy quality in full color manual PH mode is adjusted, the related full color preset auto PH mode must be adjusted.

## D. Gamma correction (Test command 61)

### (1) General

When the PC belt and the TX belt are simultaneously replaced in the case of color developer replacement (or when installing), after completion of copy quality adjustment, execute the gamma reference level setting (Test command 60), then execute gamma corection.
In this case, the main PWB dip switch 4 must be turned on and off before and after copy quality adjustment.

Turn on the dip switch "4" (Turn off the gamma correction.) → Copy quality adjustment → Turn off the dip switch "4" (Turn on the gamma correction.)
→ Set the gamma reference level. (Use test command 60.) → Gamma correction (Use test command 61.)

When only normal color copy quality adjustment is performed (developer is not replaced), perform the gamma correction and then perform copy quality adjustment.
Normally, gamma correction is performed automatically during the warm up period after the power is turned on. However, when installing or when adjusting copy quality, gamma correction should be performed for the following reasons:

- When installing, OFF-ON operation of the power is not made after setting the gamma reference level.
- Though OFF-ON operation of the power is made, if the fuser temperature is at the specified level, gamma correction is not performed.
- When performing gamma correction by OFF-ON operation of the power, warming up operation is also performed at the same time. This takes much time.

### (2) Purpose

Gamma correction is performed to provide proper color balance and proper copy density as the case developer ages between maintenance periods.

### (3) The cases which require D "Gamma correction function".

- After gamma reference level is set.
- Before copy quality adjustment is made. (Except for black-and-white copy mode)
- S60 is not executed in normal copy quality adjustment. S60 is to initialize gamma correction when all the developers, PC belts, and TX belts are new. If S60 is executed when some are not new, gamma correction is initialized with the life conditions of supply when S60 is executed, resulting in erroneous gamma correction.
  In addition, gamma sensor PWB adjustments must not be changed unless the above conditions are met.

### (4) Note

- Gamma correction must be performed with the front exterior closed. If the front exterior is open, the PC belt is exposed to external light resulting in inaccurate correction.

### (5) Problems caused by improper gamma correction

- Improper copy color balance
- Improper copy density

### (6) Gamma correction procedures

Compulsorily execution of gamma correction is made with test command 61.

① Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Turn key switch 1 ON. (Operation mode 1 is selected.)

③ Push the COLOR PSW ON.

- Gamma correction is executed with the above procedures.

## E. Copy quality set values memo

Enter the set values concerning the copy quality on the memo sheet.

# 5. Tools required for copy quality adjustment

① Color test chart (UKOG-0089CSZZ) or Kodak gray scale

② Copy paper of A4 or 8 1/2" x 11" (Considerable quantity)

# 6. Copy quality adjustment procedures

## A. Copy quality adjustment and test command

Copy quality is adjusted using the following test commands.

### (1) Manual mode copy quality adjustment & test commands

| Mode | | Adjusting color | Density level | | |
|---|---|---|---|---|---|
| | | | Density level 1 | Density level 3 | Density level 5 |
| Full color | GR | Y | S46 | — | S46 |
| | | M | S46 | — | S46 |
| | | C | S46 | — | S46 |
| | PH | Y | S46 (HD level) | | S46 (LD level) |
| | | M | S46 (HD level) | | S46 (LD level) |
| | | C | S46 (HD level) | | S46 (LD level) |
| Monochrome | GR | M | S46 | — | S46 |
| | PH | M | — | S46 | — |
| Black and white | GR | BK | S46 | — | S46 |
| | PH | BK | — | S46 | — |

In the full color mode, Y, M, and C can be simultaneously adjusted by checking the color balance.

### (2) Preset auto mode copy quality adjustment & test commands

| Mode | | Adjusting color | Overall | | Independent color | |
|---|---|---|---|---|---|---|
| | | | Density | Contrast | Density | Contrast |
| Full color | GR | Y | — | — | — | — |
| | | M | | | | |
| | | C | | | | |
| | PH | Y | S53 | S53 | S53 | — |
| | | M | | | S53 | |
| | | C | | | S53 | |
| Monochrome | GR | M | S53 | — | — | — |
| | PH | M | S53 | — | — | — |
| Black and white | GR | BK | — | — | — | — |
| | PH | BK | S53 | — | — | — |

### (3) Auto mode copy quality adjustment & test commands

| Mode | | Adjusting color | Overall | | Independent color | |
|---|---|---|---|---|---|---|
| | | | Density | Contrast | Density | Contrast |
| Full color | GR | Y | S63 | — | — | — |
| | | M | S52 | | | |
| | | C | S56 | | | |
| | PH | Y | — | — | — | — |
| | | M | | | | |
| | | C | | | | |
| Monochrome | GR | M | — | — | — | — |
| | PH | M | — | — | — | — |
| Black and white | GR | M | S51,<br>S47 | — | — | — |
| | PH | M | — | — | — | — |

## B. Outline of copy quality adjustments

### (1) Manual copy mode quality adjustment

START

↓

Execute gamma correction.
Execute with test command 61 mode 1.

↓

Full color manual mode copy quality adjustment
Use test command 46

↓

Monochrome manual mode copy quality adjustment
Use test command 46.

↓

Black-and-white manual mode copy quality adjustment
Use test command 46.

↓

END
Go to preset auto mode copy quality adjustment and auto copy mode copy quality adjustment

### (2) Preset auto mode copy quality adjustment

START

↓

Execute gamma correction.
Use test command 61 mode 1.

↓

Full color preset auto mode copy quality adjustment
Use test command 53.

↓

Monochrome preset auto mode copy quality adjustment
Use test command 53.

↓

Black-and-white preset auto mode copy quality adjustment
Use test command 53.

↓

END

### (3) Auto mode copy quality adjustment

START

↓

Execute gamma correction.
Use test command 61.

↓

AE sensor limit level setting
Use test commands 55, 52.

↓

Full color auto mode copy quality adjustment
Use test command 63.

↓

Adjust the AE level.
Use the auto/manual select key and the copy density adjusting key.

↓

Memorize the AE sensor output characteristics.
Use test command 47.

↓

Black-and-white auto mode copy quality adjustment
Use test command 51.

↓

END

Note: When the PC belt and TX belt are simultaneously replaced in the case of color developer replacement (or when installing), after completion of copy quality adjustment, execute the gamma level setting (Test command 60) and then perform gamma correction.

## C. Details of copy quality adjustment procedures

### (1) Manual mode copy quality adjustment

General

- The purpose of the manual mode copy quality adjustment is to set the copy exposure, color balance, and contrast to the predetermined level.
- Test command 46 is used for this adjustment.
- Adjustments should be made for the 18 points shown in A-(1).
- For monochrome copy adjustments, test command 46 will produce a magenta copy.

* When adjustments of different copy modes are performed consecutively, it is not required to repeat procedures ① through ③ for each mode, though this manual describes procedures ① through ③ for each mode to provide independent adjustment procedure.

* Most adjustments end with the procedure for cancelling test command 46. The cancellation of test command 46 may be omitted when the next adjustment is performed consecutively.

## a. Full color manual graphic mode copy quality adjustment

With this adjustment, copy densities of yellow, magenta, and cyan in copy density levels 1 and 5 are adjusted to the same level to achieve proper color balance.

(Note) After this adjustment, be sure to make full color preset auto graphic copy mode copy quality adjustment.

① Execute gamma correction.

(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

- The copy quantity indicator shows "1" (operation mode). (The operation mode can be selected with key switches. The selected operation mode is shown in the copy quantity indicator. Gamma correction mode is executed in operation mode 1.)

(Depress the COLOR PSW.)

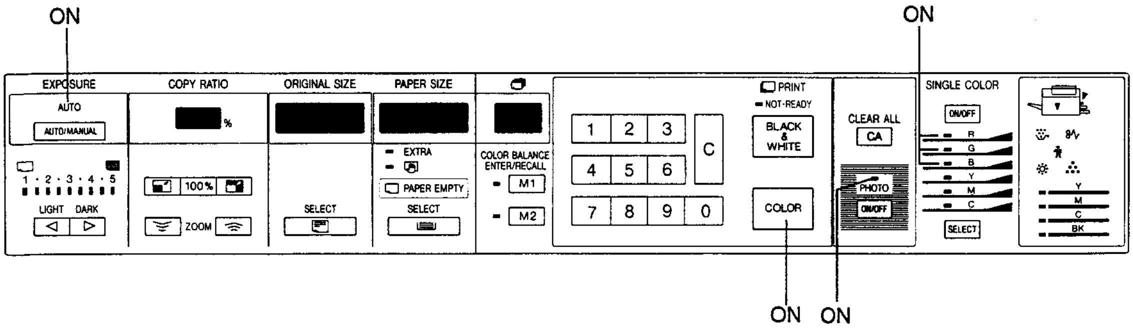
- Gamma correction is executed.

(Depress the clear switch twice to terminate test command 61.)

② Place the color test chart (UKOG-0089CSZZ) or Kodak gray scale on the original table.

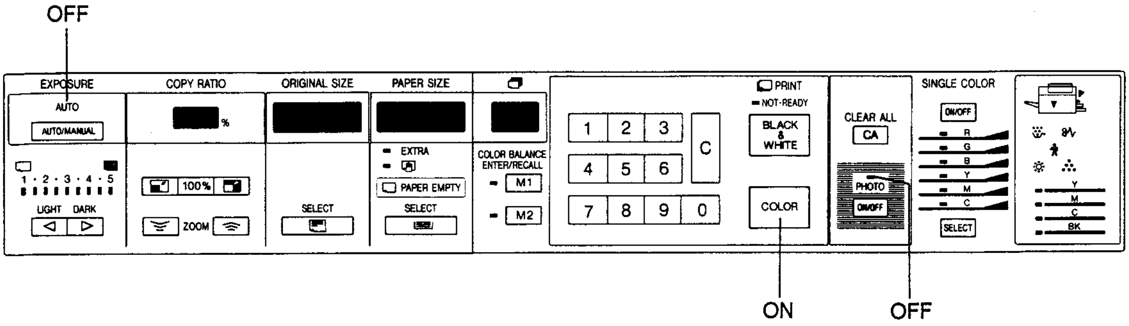
③ Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PSW).

- The machine starts to warm up, and the display lamps light up as shown below:

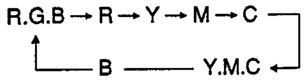

ON
ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
PRINT
NOT-READY
1 2 3
4 5 6
7 8 9 0
C
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R G B Y M C
SELECT
Y M C BK
ON ON

④ Press the auto/manual select key and the PH/GR select key to turn off the AE display lamp and the photo mode display lamp.

⑤ Push the MONOCHROME selector to light the MONOCHROME YELLOW lamp.

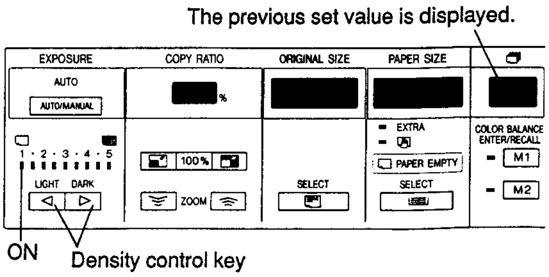

OFF
EXPOSURE
AUTO
AUTO/MANUAL
COPY RATIO
ORIGINAL SIZE
PAPER SIZE
COLOR
PHOTO
ON/OFF
SINGLE COLOR
ON
OFF

Note: Pushing the monochrome color select key rotates the monochrome color display lamp indication as below:


R.G.B → R → Y → M → C
B —— Y.M.C

⑥ Set the copy density level to "1". Density level can be selected to "1" or "5" with the density control key.

- The previous adjusting value appears in the copy quantity indicator.


The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

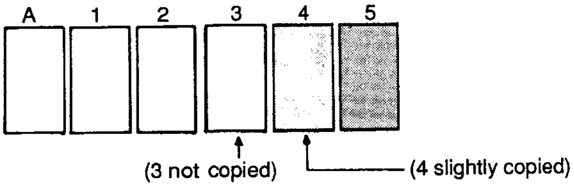
⑦ Push the COLOR PSW.

- A copy in the yellow color will be made with the density level at "1".

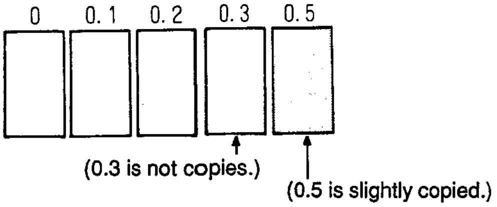
⑧ Check that the gray scale is as shown below:

(Note) Carefully check yellow image as it is faint.

[KODAK gray scale]


A
1
2
3
4
5
(3 not copied)
(4 slightly copied)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
(0.3 is not copies.)
(0.5 is slightly copied.)

⑨ Enter a new adjustment value with the numeric key.

- The value entered will then be displayed in the copy quantity indicator. Entry of a larger value reduces copy density and entry of a smaller value increases copy density.

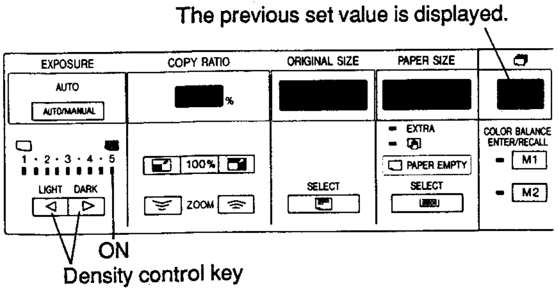
⑩ Push the COLOR PSW.

- A copy with the density set in ⑨ will be made in the yellow color.
- The adjusting value is stored in the memory.

Repeat Steps ⑧ through ⑩ until satisfactory results are obtained.

⑪ Set the density level to "5" with the density control key.

- The previous adjusting value appears in the copy number display window.

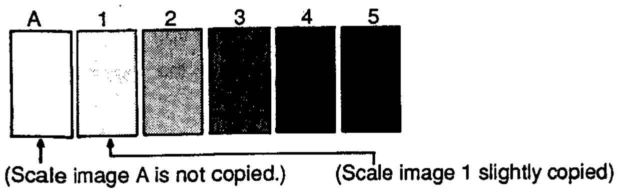

The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

⑫ Push the COLOR PSW.

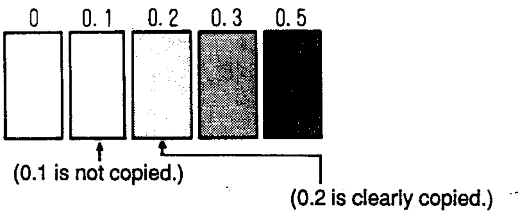
- Make a copy in the yellow color with the density level at "5".

⑬ Check that the copy gray scale is as shown below:

[KODAK gray scale]


A
1
2
3
4
5
(Scale image A is not copied.)
(Scale image 1 slightly copied)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
(0.1 is not copied.)
(0.2 is clearly copied.)

⑭ Enter a new adjust value.

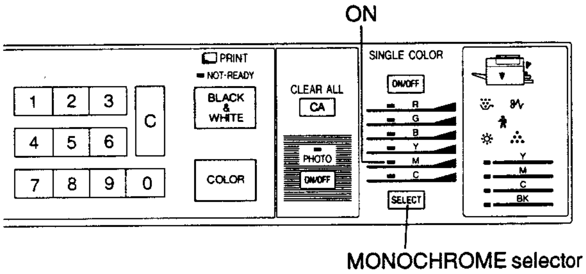
- The value entered will then be displayed in the copy.

⑮ Push the COLOR PSW.

- A copy with the density level at "5", will be produced.
- The adjusting value entered in Step ⑭ is stored in memory.
- Repeat Steps ⑬ through ⑮ until the above condition is satisfied.

⑯ Set the mode to the magenta copy mode using the MONOCHROME copy selector.

- The MONOCHROME MAGENTA lamp lights up.


ON
PRINT
NOT-READY
1
2
3
4
5
6
7
8
9
0
C
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
MONOCHROME selector

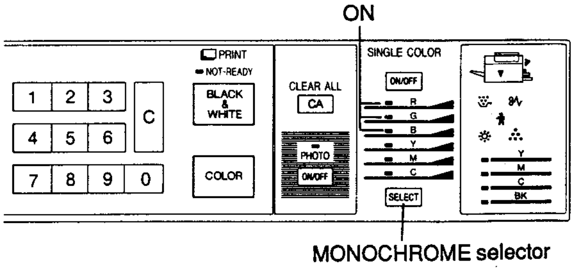
⑰ Perform the same operation as yellow copy for magenta copy mode.

⑱ Push the MONOCHROME selector to select the CYAN copy mode.

- The MONOCHROME CYAN lamp lights up.

⑲ Perform the same operation as mentioned in yellow adjustment.

⑳ Use the monochrome copy select key to set to the Red/Green/Blue mode. (Y, M, C color balance can be checked.)

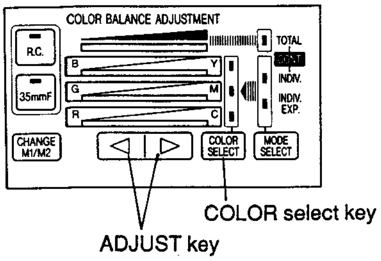

ON
PRINT
NOT-READY
1
2
3
4
5
6
7
8
9
0
C
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
MONOCHROME selector

㉑ Set the copy density to level "5", and push the COLOR PSW.

A copy is procedure.

㉒ Check the color balance. (When the color balance is correct, the slightly copied portion of the copy gray scale image is perfectly gray. If the color balance is improper, this portion includes color other than gray.

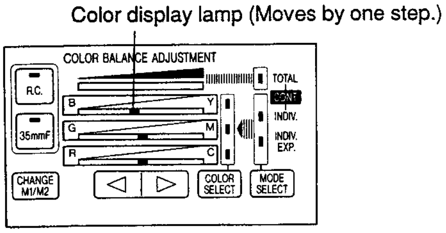
If the color balance is improper, use the COLOR SELECT key and the ADJUST key on the color adjusting panel to make fine adjustment of each color.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
CHANGE M1/M2
B Y
G M
R C
TOTAL
CONT
INDIV.
INDIV. EXP.
COLOR SELECT
MODE SELECT
COLOR select key
ADJUST key

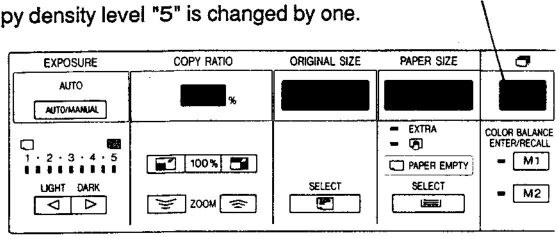
(Example) In the case of yellowish gray, yellow is strong in the color balance.

- Push the COLOR SELECT key to select Blue/Yellow, and push the ADJUST key to make yellow weaker.
  (The color display lamp goes to the left as yellow becomes weaker.)
- Make a copy to check the color balance.
- If yellow is still too strong, repeat the above procedure.
- Repeat the above procedure until the satisfactory result is obtained.

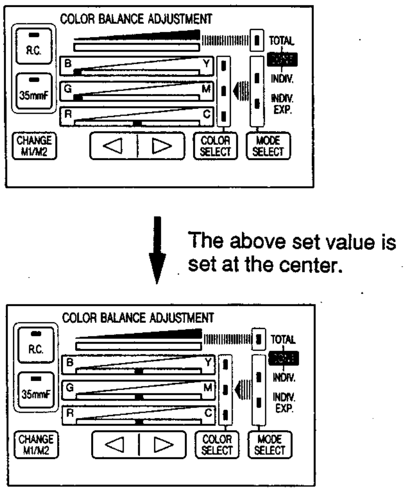
(Note) When the color display lamp moves by one step, test command 46 set value (yellow level) for copy density level 5 is changed by one.


Color display lamp (Moves by one step.)
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
CHANGE M1/M2
B Y
G M
R C
TOTAL
CONT
INDIV.
INDIV. EXP.
COLOR SELECT
MODE SELECT

When the color display lamp moves by one step, the set value for copy density level "5" is changed by one.


EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2

If adjustment of more than 4 steps is required, use the monochrome copy select key to rotate the monochrome copy color display lamp one turn (Red/Green/Blue → Red → Yellow → Magenta ----- Blue → Red/Green/Blue), and the first lamp position comes to the center.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
CHANGE M1/M2
B Y
G M
R C
TOTAL
CONT
INDIV.
INDIV. EXP.
COLOR SELECT
MODE SELECT
The above set value is set at the center.

㉓ Set the copy density level to 1, make a full color copy, and check the color balance.

Note: In the CX-7700, the color balance and brightness can be adjusted by making a full color copy with the color select key. Therefore, each color brightness can be adjusted in the color balance mode from the beginning.

## b. Full color manual photo copy mode copy quality adjustment

Color balance is adjusted by adjusting copy densities (exposure) of yellow, magenta, and cyan in photo mode high density (HD) image area and low density (LD) image area copy density level.

There are two ways of this adjustment.

- Select Y, M, or C with the monochrome copy select key, set to the photo mode, and adjust the density using the gray scale. For selection between the high density (HD) are and the low density (LD) area, use the density adjust key.
- After automatic exposure adjustment (AEA), make a full color copy and perform fine adjustment of Y, M, and C level in the HD area and LD area by color balance using the ADJUST key.

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1→ COLOR PSW ON)

[Y, M, C copy density adjustment procedure]

② Place the color test chart (UKOG-0089CSZZ) or Kodak gray scale on the original table.

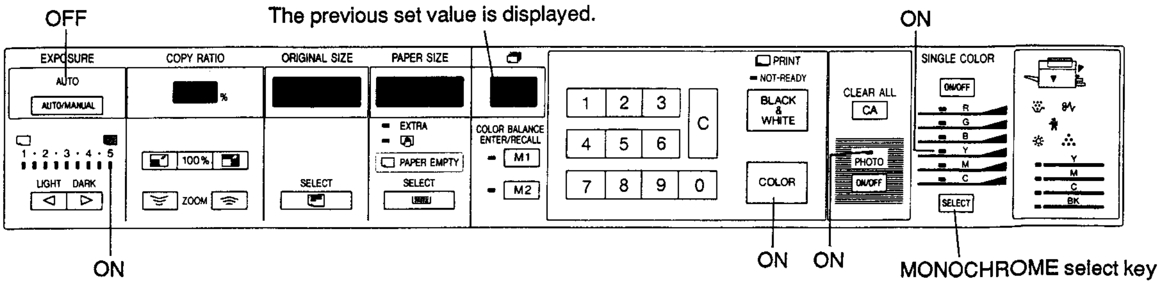
③ Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PSW).

④ Push the auto/manual density select key to turn off the auto density display lamp. At that time, the photo mode display lamp is on.

- The copy density (exposure) is set to "5", and the copy density in the LD area is set.

⑤ Push the MONOCHROME mode selector to enter the yellow copy mode. (The monochrome yellow lamp lights up.)

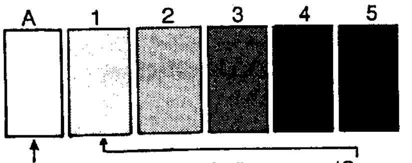
- The previous adjusting value appears in the copy number display window.


OFF
The previous set value is displayed.
ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
ON
ON ON
MONOCHROME select key

⑥ Push the COLOR PSW.
- The screen is set.
- A copy in the monochrome yellow color is produced with the exposure setting at "5". (LD area copy)

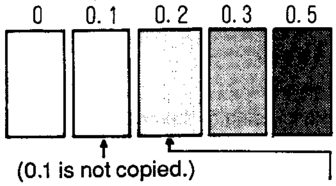
⑦ Check that the copy image of the gray scale is as shown below:

[KODAK gray scale]



(Gray scale A not copied) (Gray scale 1 slightly copied)

[UKOG-0089CSZZ]



(0.1 is not copied.) (0.2 is slightly copied.)

⑧ Enter a new adjust value.
- The value entered will then be displayed in the copy number window. Entry of a larger value makes copy density reduced and entry of a smaller value makes copy density increased.

⑨ Push the COLOR PSW.
- A yellow copy is produced with the set value in ⑧, and the adjust value is stored in the memory.

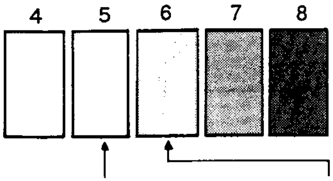
Repeat Steps ⑦ through ⑨ until satisfactory result is obtained.

⑩ Set the copy density level to "1" with the density adjust key. (The copy density in HD area is set.)
- The previously set value is displayed in the copy quantity display.

⑪ Push the COLOR PSW.
- A yellow copy is produced. (HD area copy) At that time, the screen is repleased.

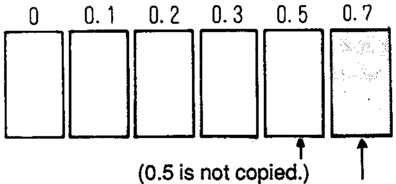
⑫ Check the gray scale is as shown below:

[KODACK gray scale]



Gray scale 5 is not copied. Gray scale 6 is slightly copied.

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
0.7

(0.5 is not copied.) (0.7 is clearly copied.)

⑬ Enter a new set value with the numeric key.
- The set value is displayed in the copy quantity display. (The greater the set value is, the smaller the copy density is, and vice versa.)

⑭ Push the COLOR PSW.
- A yellow copy is produced with the set value in ⑬.

Repeat procedures ⑫ to ⑭ until the above condition is obtained.

⑮ Set the mode to the magenta copy mode using the MONOCHROME mode selector. (The MONOCHROME MAGENTA lamp lights up.)

⑯ Perform the same operation as yellow copy mode steps ⑤ through ⑭ magenta copy mode.

⑰ Push the MONOCHROME mode selector to light the CYAN copy lamp. (The MONOCHROME CYAN lamp lights up.)

⑱ Perform the same operation as yellow copy mode Steps ⑤ through ⑭ for cyan copy mode.

⑲ Push the monochrome color select key to set to the Red/Green/Blue copy mode. (Y, M, C copy color balance in the full color manual photo copy mode can be checked.)

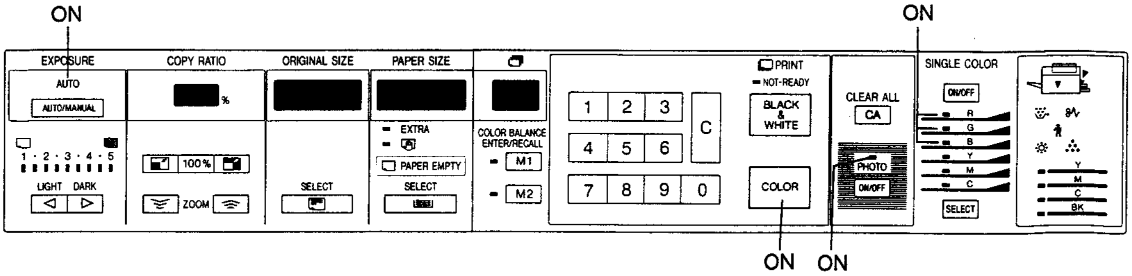
⑳ Set the copy density level to 1 (HD) or 5 (LD), and push the COLOR PSW.

㉑ Check the color balance. (When the color balance is correct, the slightly copied portion of the copy gray scale image is perfectly gray. If the color balance is incorrect, this portion includes color other than gray. For example, if yellowish gray is seen, yellow density is too strong.)

If the color balance is improper, perform the same procedure as the full color manual graphic mode copy quality adjustment color balance adjustment ㉒ until the proper color balance is obtained.

[Full color copy adjustment procedure after automatic exposure adjustment]

① Perform test command 46 (C → 0 → 0 → C → 46 → COLOR PSW)
The display lamps light up as shown below:


ON
ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
ON
ON

② Press the auto/manual select key to cancel the auto exposure mode. Then press the exposure adjustment key to set the copy exposure to 5 (LD image area).

③ Make a full color copy to check the LD image area copy color balance.
If color balance is shifted greatly, select the auto exposure adjustment mode with the auto/manual select key, and go to procedure ④. If color balance is shifted slightly, go to procedure ⑨ to perform fine adjustment of each color with the ADJUST key in the color adjust panel.

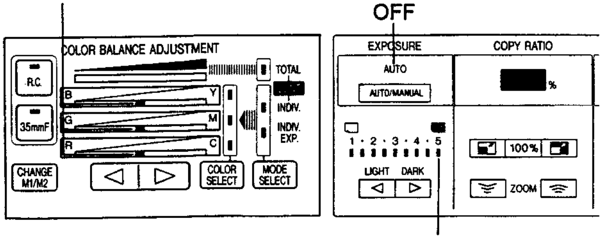
④ Check that there is nothing on the document table, close the document cover.

⑤ Push the COLOR PSW.
At that time, the auto exposure adjustment mode is set and the toner density on the PC and TX belts is measured with the gamma sensor using the document cover white as the standard, setting the best suitable exposure voltage automatically.

Note: This mode is effective only for the low density (LD) area in the full color photo mode and the monochrome photo mode.

⑥ Push the auto/manual density select key to cancel the auto exposure adjust mode.
The copy density display lamp shows copy density of "5," and the color balance adjustment mode in the low density (LD) area is set.
By executing the auto exposure adjustment, the adjustments in the all modes described above are performed. Each color in each mode cannot be adjusted separately.

The color adjustment display lamps light at the center.


OFF
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM

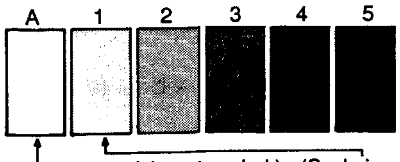
⑦ Set a test chart (UKOG-0089CSZZ) or Kodak gray scale on the document table.

⑧ Push the COLOR PSW.

- The screen is set.
- A full color copy is produced. (The copy image is a virtually standard full color copy with Y, M, and C overlapped, and allows to check the gray scale.)

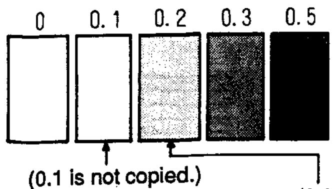
⑨ Check that the gray scale is as shown below:

[KODAK gray scale]



(Scale image A is not copied.) (Scale image 1 is slightly copied.)

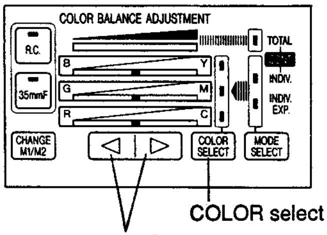
[UKOG-0089CSZZ]



(0.1 is not copied.)

(0.2 is slightly copied.)

⑩ If the color balance is improper, perform fine adjustment with the color select key and the ADJUST key.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT

COLOR select key

ADJUST key

Adjust each of Y, M, and C with the color select key and the ADJUST key.

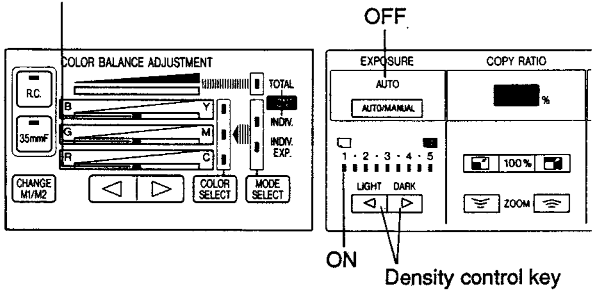
Example: When Yellow/Blue is selected with the color select key Pushing the adjust key to set to the right makes yellow darker and blue lighter.
Pushing the adjust key to set to the left makes yellow lighter and blue darker.

⑪ Push the COLOR PSW.
A full color copy is produced according to the setting in ⑨.
Repeat procedures ⑨ to ⑪ until the condition in ⑨ is satisfied.

⑫ Push the density control key "LIGHT" to set to copy density "1."

- The high density (HD) area color balance adjust mode is set.

The color adjustment display lamps light at the center.


OFF
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ON

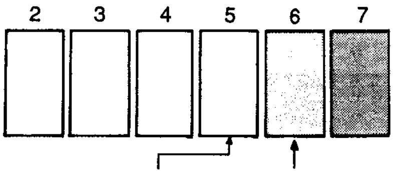
Density control key

⑬ Push the COLOR PSW.

- A full color copy is produced. At this time, the screen is not set.

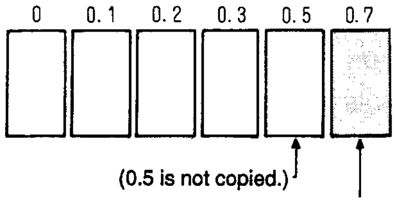
⑭ Check that the gray scale is as shown below:

[KODAK gray scale]



(Scale image 5 is not copied.) (Scale image 6 is slightly copied.)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
0.7

(0.5 is not copied.)

(0.7 is clearly copied.)

⑮ If the color balance is improper, perform fine adjustment of each color with the color select key and the ADJUST key.

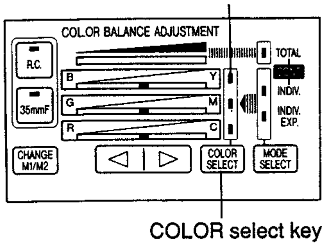
⑯ Push the COLOR PSW.
A full color copy is produced according to the setting in ⑮, and adjusted value is stored to the memory.

⑰ Repeat procedures ⑭ to ⑯ until the condition in ⑭ is satisfied.

[Color balance adjustment with the color adjustment panel]

- Select the suitable mode with the color select key.

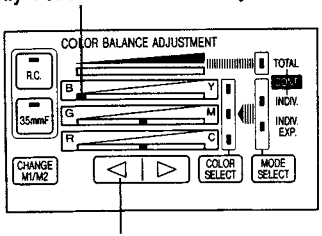
ON


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT

COLOR select key

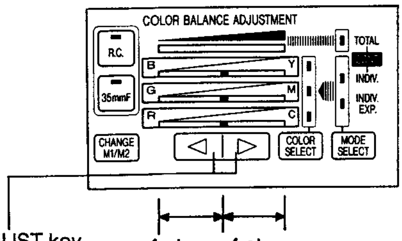
- Only the adjustment of the mode selected with the color select key is allowed. (The figure below shows where Yellow/Blue is selected.)

Only Yellow/Blue can be adjusted.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT

ADJUST key

- Each color can be adjusted by 4 steps to the left and to the right. (Pushing the Adjust key once moves the color display lamp by one step.)

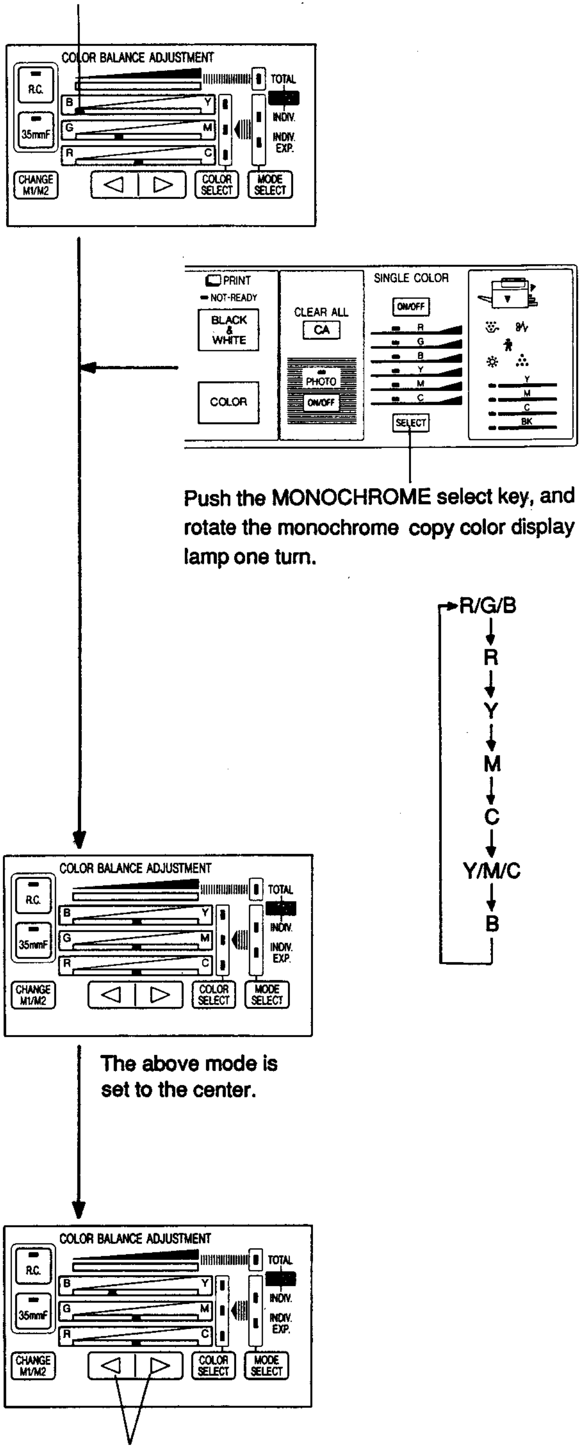

COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT

ADJUST key

4 steps 4 steps

- If adjustment of more than 4 steps is required, use the monochrome copy select key to rotate the monochrome copy color display lamp one turn (Red/Green/Blue → Red → Yellow → Magenta → ... Blue → Red/Green/Blue), and the first lamp position comes to the center.

To make yellow lighter and blue darker furthermore:


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
R/G/B
R
Y
M
C
Y/M/C
B

**Push the MONOCHROME select key, and rotate the monochrome copy color display lamp one turn.**

**The above mode is set to the center.**

ADJUST key

**Use the adjust key to make Yellow lighter.**

## c. Monochrome graphics manual copy mode copy quality adjustment

(Note) After this adjustment, be sure to make monochrome preset auto graphic copy mode copy quality adjustment.

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place the Kodak gray scale on the original table.

③ Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PSW).

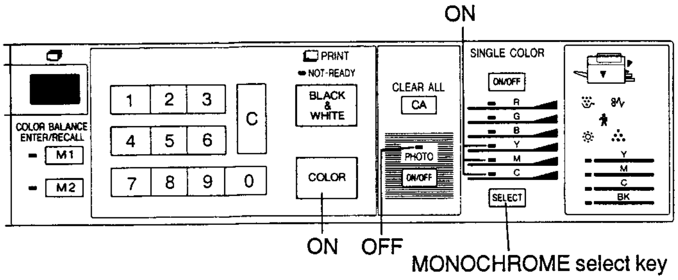
- The machine starts to warm up.

④ Push the PHOTO/GRAPHICS mode selector.

- The PHOTO mode lamp turns off.

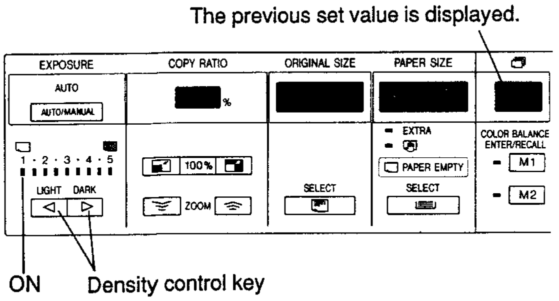
⑤ Push the auto/manual select key to turn off the auto density display lamp.

⑥ Push the MONOCHROME mode selector to light the Y, M, and C lamps.


ON
PRINT
NOT-READY
1 2 3
4 5 6
7 8 9 0
C
COLOR BALANCE ENTER/RECALL
M1
M2
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
ON
OFF
MONOCHROME select key

⑦ Set the density level to "1" using the density control key.
(When pressing the density control key, the density level is set to "1" or "5".)

- The previous adjusting value appears on the copy number display window.

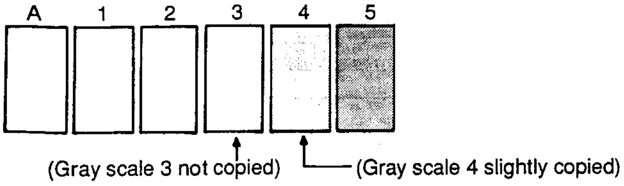

The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

⑧ Push the COLOR PSW.

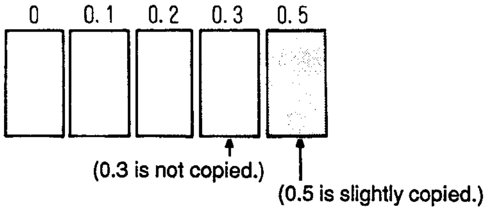
- Make a copy in the monochrome magenta color with the density level at "1".

⑨ Check that the gray scale of magenta copy is as shown below:

[KODAK gray scale]


A
1
2
3
4
5
(Gray scale 3 not copied)
(Gray scale 4 slightly copied)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
(0.3 is not copied.)
(0.5 is slightly copied.)

⑩ Enter a new adjust value.

- The value entered will then be displayed in the copy number window.

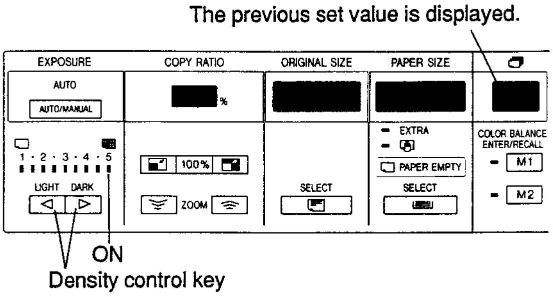
⑪ Push the COLOR PSW.

- Make a magenta copy with the density level at "1". Then, you will have a copy that resulted from the adjustment done in Step ⑩.

Repeat Steps ⑨ through ⑪ until satisfactory result in ⑨ is obtained.

⑫ Set the copy density setting to "5".

- The previous adjusting value appears on the copy number display window.

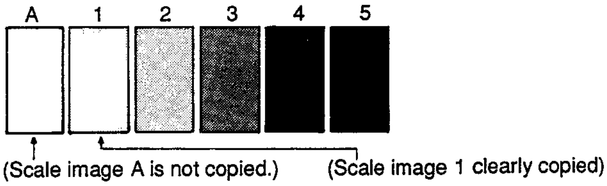

The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

⑬ Push the COLOR PSW.

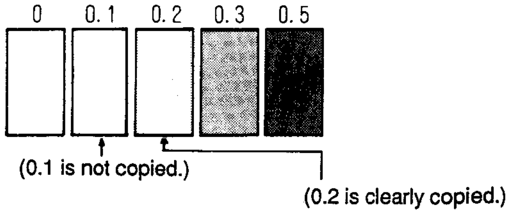
- Make a copy in the magenta color with the density level at "5".

⑭ Check that the gray scale of magenta copy is as below:

[KODAK gray scale]


A
1
2
3
4
5
(Scale image A is not copied.)
(Scale image 1 clearly copied)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
(0.1 is not copied.)
(0.2 is clearly copied.)

⑮ Enter a new adjust value.

- The value entered will then be displayed in the copy number window.

⑯ Push the COLOR PSW.

- Make a copy with the density level at "5".
- The adjusting value entered in Step ⑮ is set.

Repeat Steps ⑭ through ⑯ until satisfactory result in ⑭ is obtained.

⑰ Push the CLEAR key twice to cancel test command 46.

## d. Monochrome photo manual copy mode copy quality adjustment

(Note) After this adjustment, be sure to make monochrome preset auto photo copy mode copy quality adjustment.

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place the Kodak gray scale on the original table.

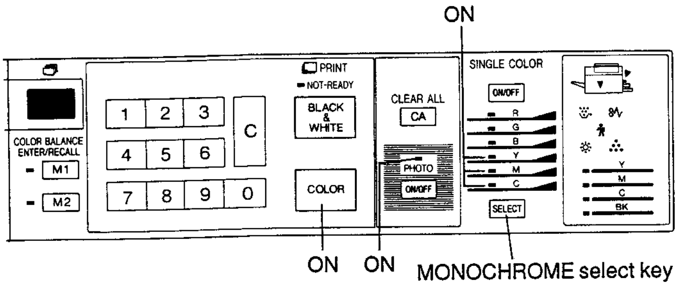
③ Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PSW).

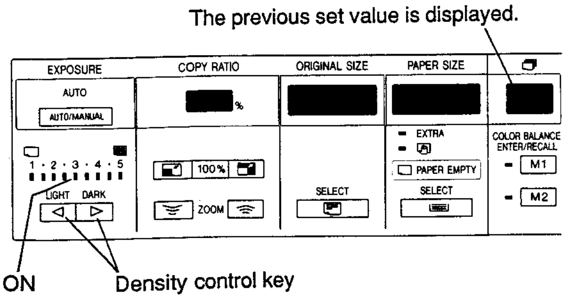
④ Push the auto/manual select key to turn off the auto density copy display lamp.

- The PHOTO mode indicator turns on.
- The COLOR copy ready lamp lights up.

⑤ Push the MONOCHROME mode selector to light the Y, M, and C lamps.

- The copy density level is set to "3".
- The previous adjusting value appears in the copy number display window.


ON
PRINT
NOT-READY
BLACK & WHITE
CLEAR ALL
CA
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
BK
COLOR BALANCE ENTER/RECALL
M1
M2
1
2
3
4
5
6
7
8
9
0
C
COLOR
PHOTO
ON/OFF
SELECT
ON
ON
MONOCHROME select key

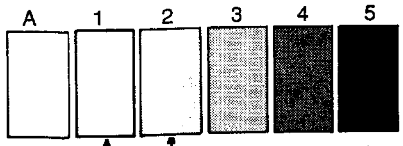

The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT
DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

⑥ Push the COLOR PSW.

- The screen is set.
- A magenta copy is produced.

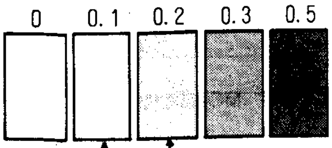
⑦ Check that the gray scale is as shown below:

[KODAK gray scale]



(Gray scale 1 not copied) (Gray scale 2 clearly copied)

[UKOG-0089CSZZ]



(0.1 is not copied.) (0.2 is slightly copied.)

⑧ Enter a new adjust value.

- The value entered will then be displayed in the copy number window.

⑨ Push the COLOR PSW.

- A magenta copy with exposure setting in ⑧ produced.
- The adjusting value entered in Step ⑧ is stored in memory.

Repeat Steps ⑦ through ⑨ until satisfactory result in ⑦ is obtained.

⑩ Push the CLEAR key twice to cancel test command 46.

Note: The auto exposure adjustment (AEA) mode is effective in this mode, too. If the brightness is shifted greatly, execution of AEA mode will automatically adjust in the same manner as the full color photo mode.

## e. Black/White manual graphic copy mode copy quality adjustment

(Note) After this adjustment, be sure to make black/white auto copy graphic mode copy quality adjustment.

① Set the test chart (UKOG-0089CSZZ) or Kodak gray scale on the original table..

② Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PWS).

- The machine starts to warm up.
- The COLOR copy ready lamp lights up.

③ Push the PHOTO/GRAPHICS selector to turn off the PHOTO mode lamp.
(The PHOTO mode lamp goes off.)

④ Push the auto/manual density select key to turn off the auto density display lamp.

⑤ Push the MONOCHROME mode selector to turn off the blue lamp.

- The BLACK/WHITE copy ready lamp turns on.
- The COLOR copy ready lamp turns off.

⑥ Set the copy density level setting to "1".

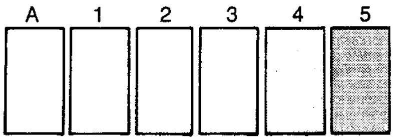
- The previous adjusting value appears in the copy number display window.

⑦ Push the BLACK/WHITE PSW.

- Make a copy in the black/white mode with the density level at "1".

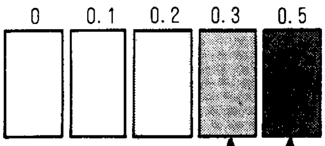
⑧ Check that the gray scale is as shown below:

[KODAK gray scale]



(Gray scale image 4 slightly copied)
(Gray scale image 3 not copied)

[UKOG-0089CSZZ]



(0.3 is not copied.) (0.5 is slightly copied.)

⑨ Enter a new adjust value.

- The value entered will then be displayed in the copy number window.

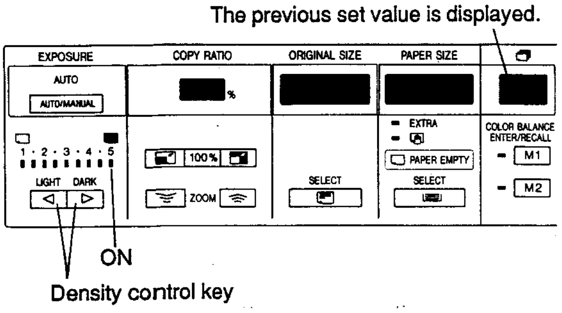
⑩ Push the BLACK/WHITE PSW.

- Make a black/white copy with the density level at "1".
- The adjusting value entered in step ⑧ is stored in memory.

⑪ Repeat steps . through ⑨ until satisfactory result in ⑦ is obtained.

⑫ Set the density level to "5".

- The previous adjusting value appears in the copy number display window.

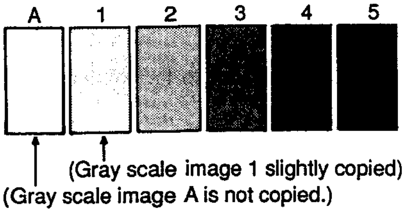

The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
Density control key

⑬ Push the BLACK/WHITE PSW.

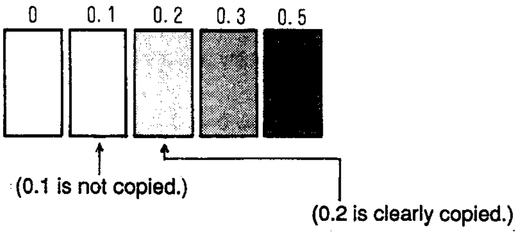
- Make a copy in the black/white mode with the density level at "5".

⑭ Check that the gray scale is as shown below:

[KODAK gray scale]


A
1
2
3
4
5
(Gray scale image 1 slightly copied)
(Gray scale image A is not copied.)

[UKOG-0089CSZZ]


0
0.1
0.2
0.3
0.5
(0.1 is not copied.)
(0.2 is clearly copied.)

⑮ Enter a new adjust value.

- The value entered will then be displayed in the copy number window.

⑯ Push the BLACK/WHITE PSW.

- Make a copy with the density level at "5".
- The adjusting value entered in step ⑭ is stored in the memory.

⑰ Repeat steps ⑫ through ⑮ until satisfactory result in ⑬ is obtained.

⑱ Push the clear key twice to cancel test command 46.

### f. Black and white manual photo copy mode copy quality adjustment

(Note) After this adjustment, be sure to make black and white preset auto photo copy mode copy quality adjustment.

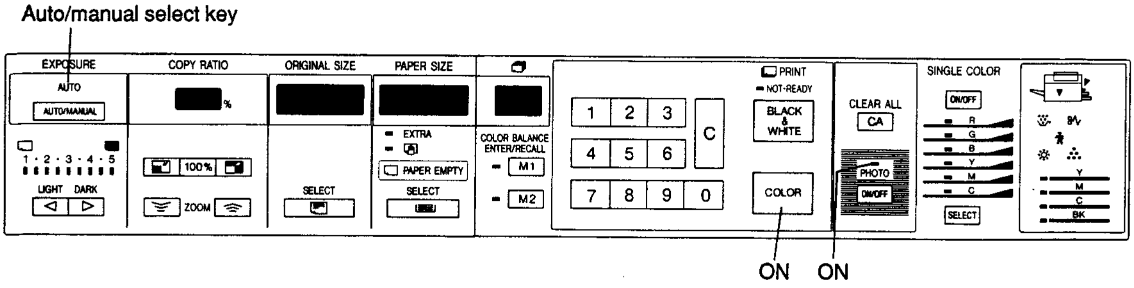
① Place the Kodak gray scale on the original table.

② Execute test command 46 (C → 0 → 0 → C → 4 → 6 → COLOR PSW).

- The machine starts to warm up.
- The COLOR copy ready lamp turns on.

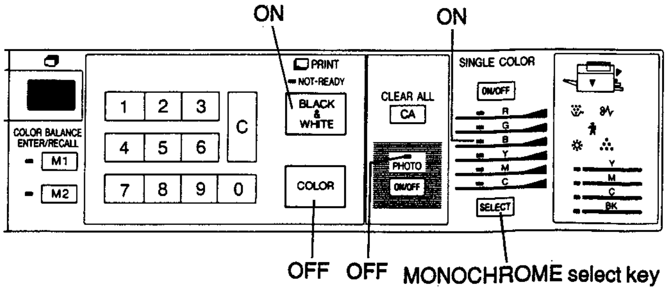
③ Push the auto/manual density select key to turn off the display lamp.

- The PHOTO mode indicator turns on.


Auto/manual select key
EXPOSURE
AUTO
AUTO/MANUAL
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
ON
ON

④ Push the MONOCHROME mode selector to turn ON the blue lamp.

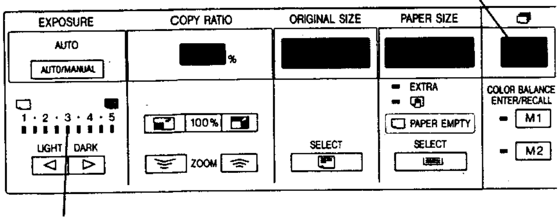
- The BLACK/WHITE copy ready lamp turns on.
- The COLOR copy ready lamp turns off.
- The photo mode lamp turns off.


ON
ON
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
OFF
OFF
MONOCHROME select key

- The previous adjusting value appears in the copy number display window.

⑤ Push the photo/graphic mode select key to turn on the photo mode lamp.
- The photo mode lamp lights up.
- The copy density level is set to "3".

The previous set value is displayed.

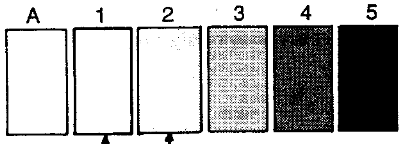


ON

⑥ Push the BLACK/WHITE PSW.
- A copy in the black/white mode is produced.

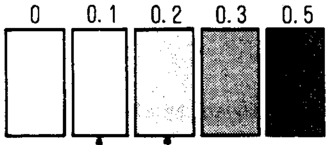
⑦ Check that the gray scale is as shown below:

[KODAK gray scale]



(Gray scale image 2 slightly copied)
(Gray scale image 1 not copied)

[UKOG-0089CSZZ]



(0.1 is not copied.)
(0.2 is slightly copied.)

⑧ Enter a new adjust value.
- The value entered will then be displayed in the copy number window.

⑨ Push the BLACK/WHITE PSW.
- Make a black/white copy.
- The adjusting value entered in step ⑧ is stored in the memory.

⑩ Repeat steps ⑧through ⑩ until satisfactory result in ⑧ is obtained.

⑪ Push the clear switch twice to cancel test command 46.

## (2) Preset auto copy mode copy quality adjustment

The purpose of the auto copy mode copy quality adjustment is to set the copy density and color balance to user's preference.
By adjusting the density level and contrast, the copy density and the color balance could be set to the user's preference.
Adjustment will be done in reference to the standard setting by the manual copy mode copy quality adjustment level (the setting set by test command 46).
Test command 53 is used for this adjustment.

- Adjustment must be done at 11 points mentioned in the table below:

### Adjusting points vs. adjustment steps

| Copy mode | | Adjusting color | Overall | | Independent color | | Reference page |
|---|---|---|---|---|---|---|---|
| | | | Density | Contrast | Density | Constrast | |
| Full color | GR | Y | — | — | — | — | |
| | | M | | | | | |
| | | C | | | | | |
| | PH | Y | ① (a-①~⑨) | ② (b-①~⑩) | ③ (c-①~⑪)<br>④ (d-①~⑪)<br>⑤ (e-①~⑪) | — | ① 4-12 ② 4-12<br>③ 4-13 ④ 4-13<br>⑤ 4-14 |
| | | M | | | | | |
| | | C | | | | | |
| Monochrome | GR | M | ⑥ (f-①~⑪) | — | — | — | 4-15 |
| | PH | M | ⑦ (g-①~⑩) | | | | 4-15 |
| Black and white | GR | BK | | — | — | — | |
| | PH | BK | ⑧ (h-①~⑨) | | | | 4-16 |

- The adjustments must be done in the following order.

① Overall density adjustment

② Overall contrast adjustment

③ Independent color density adjustment

- Adjustments of copy density and contrast for each color in full color copy mode are made when more deliberate color balance is demanded by the user after completing the overall adjustments of copy density.
- Adjustment for the monochrome mode must be done for magenta color.

⁎ When adjustments of different modes are performed continuously it is not required to repeat procedures ① through ③ for each mode, though this manual describes procedures ① through ③ for each mode to provide independent adjustment procedures.

- Every adjustment ends with the procedure for cancelling the corresponding test command, which may be ommitted when the next adjustment is performed consecutively.

- If copy quality adjustment (test command 53) in the preset auto copy mode is not made, the copy quality will be the same as that of the medium copy density and the medium contrast in the manual copy mode.
- Preservation of copy sample
  In preset auto copy mode copy quality adjustment, color balance, copy density, and contrast are adjusted to the user's preference and there are no reference. Therefore it is advisable to take and preserve copy sample after preset auto copy mode copy quality adjustment for future reference. It will eliminate the need for asking user's preference at every adjustment.

### a. Full color preset auto photo copy mode overall copy density adjustment

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

- The copy quality indicator shows "1" (operation mode). (The operation mode can be selected with key switches. The selected operation mode is shown in the copy quality indicator. Gamma correction mode is executed in operation mode 1.)

(Push on the COLOR PSW.)

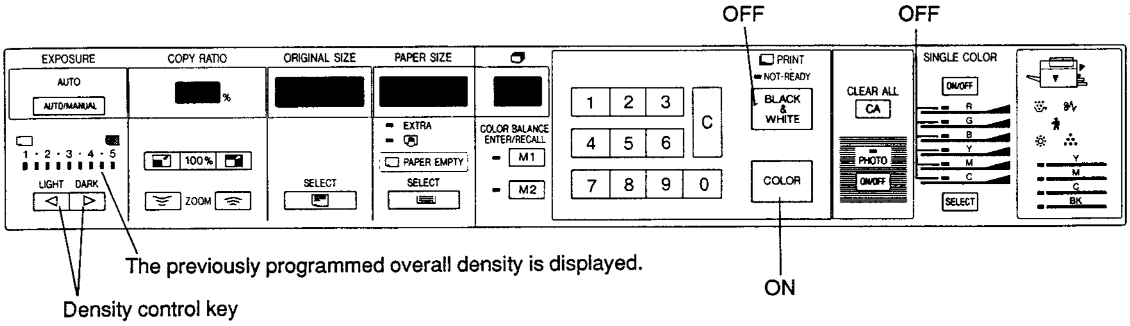
- Gamma correction is executed.

(Push the clear switch twice to terminate test command 61.)

② Place a full color original specified by user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

- The machine starts to warm up.
- The COLOR copy ready lamp turns on.
- The MONOCHROME mode lamp turns off.
- The PHOTO copy mode turns on.
- The level of the overall density previously programmed is displayed.


EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
BK

OFF

OFF

ON

The previously programmed overall density is displayed.

Density control key

④ Push the COLOR PSW.

- A full color copy is produced.

⑤ Check that the overall density level matches to the user's preference. (This key changes only the LD area image density in the photo mode.
If the above condition is met, go to Steps ⑨.

⑥ Set a new overall density level using the density control key.

⑦ Push the COLOR PSW.

- A full color copy is produced according to the adjustment done in Step ⑥.
- The adjusting value entered in Step ⑥ is stored in the memory.

⑧ Check that the overall density level matches to the user's preference.
Repeat steps ⑥ through ⑧ until satisfactory result is obtained.

⑨ Push the CLEAR key twice to cancel the test command 53.

### b. Full color preset auto photo copy mode overall contrast adjustment

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place a full color original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

- The machine starts to warm up.
- The COLOR copy ready lamp turns on.
- The MONOCHROME mode lamp turns off.
- The PHOTO copy mode lamp turns on.

④ Push the COLOR PSW.

- A full color copy is produced.

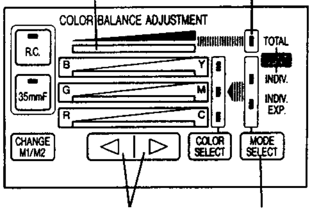
⑤ Check that the overall contrast matches to the user's preference.
If the above condition is met, go to Step ⑩.

⑥ Choose the overall contrast adjustment mode using the MODE selector in the color adjustment panel.

- The OVERALL CONTRAST ADJUST mode lamp turns on.
- The previously programmed overall contrast is displayed in the color adjustment panel overall contrast indicator window.

The previously programmed overall contrast is displayed.

ON


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
CHANGE M1/M2
COLOR SELECT
MODE SELECT

ADJUST key

Mode select key

⑦ Enter a new overall contrast setting using the ADJUST key in the color adjustment panel.

⑧ Push the COLOR PSW.

- A full color copy is produced according to the adjustment done in Step ⑦.
- The adjusting value entered in Step ⑦ is set.  
  Moving the key to the right increases the overall contrast, and moving he key to the left decrease the overall contrast.

⑨ Check that the overall contrast level matches to the user's preference. This key changes only the LD area image density in the photo mode.  
Repeat steps ⑦ through ⑨ until satisfactory result is obtained.

⑩ Push the CLEAR key twice to cancel the test command 53.

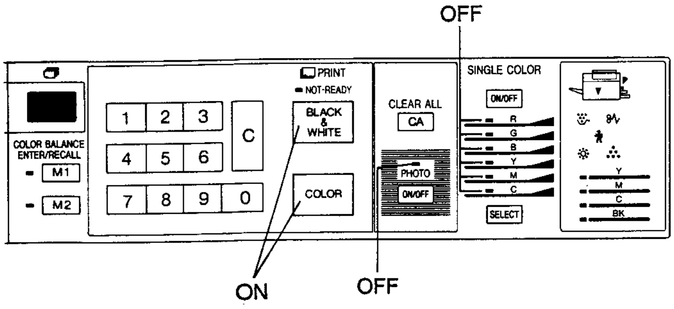
### c. Full color preset auto photo yellow/blue copy density adjustment (Individual color copy density adjustment)

① Execute gamma correction.  
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place an original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

- The machine starts to warm up.
- The COLOR copy ready lamp turns on.
- The MONOCHROME mode lamp turns off.
- The PHOTO copy mode lamp turns on.


OFF
PRINT
NOT-READY
SINGLE COLOR
COLOR BALANCE ENTER/RECALL
M1
M2
1
2
3
4
5
6
7
8
9
0
C
BLACK & WHITE
COLOR
CLEAR ALL
CA
ON/OFF
R
G
B
Y
M
C
PHOTO
ON/OFF
SELECT
Y
M
C
BK
ON
OFF

④ Push the COLOR PSW.

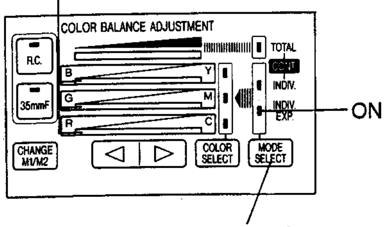
- A full color copy is produced.

⑤ Check that the yellow/blue density matches the user's preference.  
If the above condition is met, go to Step ⑫.

⑥ Choose the individual color density adjust mode using MODE selector in the color adjustment panel.

- The INDIVIDUAL COLOR density lamps turn on.
- The previously programmed individual color density level is displayed in the individual color density level window in the color adjustment panel.

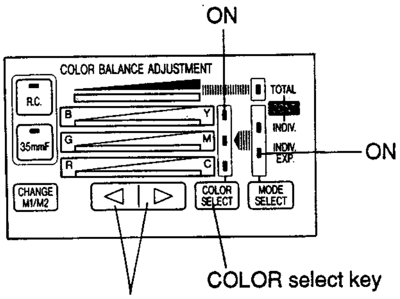
The previously programmed individual color density level is displayed.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT

MOde select key

⑦ Select yellow using the COLOR select key in the color adjustment panel.

- The YELLOW lamp in the panel turns on.


ON
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT

COLOR select key

ADJUST key

⑧ Enter a new yellow/blue density level.

⑨ Push the COLOR PSW.

- A full color copy is produced according to the adjustment done in Step ⑧.
- The adjusting value entered in Step ⑧ is set.  
  When the color balance setting is shifted towards the right side, the yellow density increases and the blue density decreases.  
  When the color balance setting is shifted towards the left side, the yellow density decreases and the blue density increases.

⑩ Check that the yellow and blue density matches the user's preference.  
Repeat steps ⑨ through ⑪ until satisfactory result is obtained.

⑪ Push the CLEAR key twice to cancel the test command 53.

### d. Full color preset auto photo magenta/green copy density adjustment (Individual color copy density adjustment)

① Execute gamma correction.  
(Execute test command 61. (C→ 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place a full color original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

④ Push the COLOR PSW.

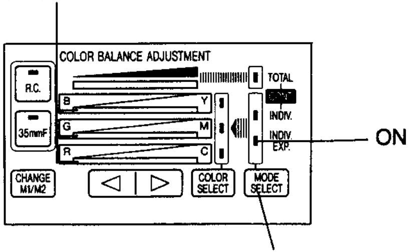
- A full color copy is produced.

⑤ Check that the magenta/green density matches the user's preference.  
If the above condition is met, go to Step ⑪.

⑥ Choose the individual color copy density adjust mode using MODE selector inside the blind panel.

- The INDIVIDUAL COLOR copy density adjust lamps turn on.
- The previously programmed individual color copy density is displayed in the individual color copy density level window inside the color adjustment panel.

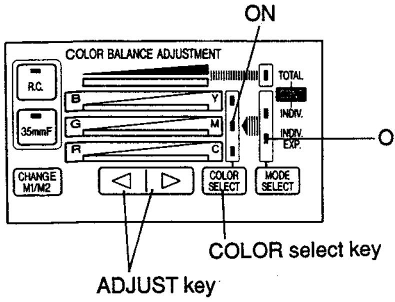
The previously programmed individual color density is displayed.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT

Mode select key

⑦ Select magenta using the COLOR select key inside the color adjustment panel.

- The MAGENTA lamp in the color adjustment panel turns on.


ON
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT
COLOR select key
ADJUST key

⑧ Enter a new level of magenta/green density.

⑨ Push the COLOR PSW.

- A full color copy is produced according to the adjustment done in Step ⑧.
- The adjusting value entered in Step ⑧ is stored in memory. When the color balance setting is shifted towards the right side, the magenta density increases and the green density decreases. When the color balance setting is shifted towards the left side, the magenta density decreases and the green density increases.

⑩ Check that the magenta and green density matches the user's preference.
Repeat steps ⑧ through ⑩ until satisfactory result is obtained.

⑪ Push the CLEAR key twice to cancel the test command 53.

### e. Full color preset auto photo cyan/red copy density level adjustment (Individual color copy density adjustment)

① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place a full color original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

④ Push the COLOR PSW.

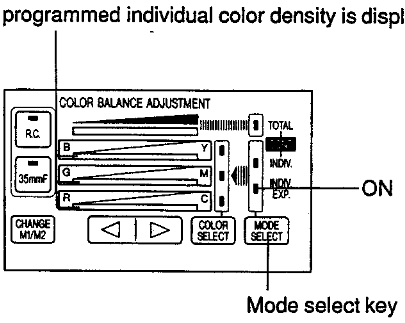
- A full color copy is produced.

⑤ Check that the cyan/red density matches the user's preference.

If the above condition is met, go to Step ⑪.

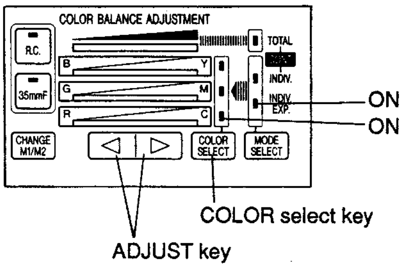
⑥ Choose the individual color density adjust mode using MODE selector inside the color adjustment panel.

- The INDIVIDUAL COLOR density adjust lamps turn on.
- The previously programmed individual color density level is displayed in the individual color density window inside the color adjustment panel.


The previously programmed individual color density is displayed.
COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT
Mode select key

⑦ Select cyan using the COLOR select key inside the blind panel.

- The CYAN lamp in the blind panel turns on.


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
B
Y
G
M
R
C
TOTAL
INDIV.
INDIV. EXP.
ON
ON
CHANGE M1/M2
COLOR SELECT
MODE SELECT
COLOR select key
ADJUST key

⑧ Enter a new cyan/red density level.

⑨ Push the COLOR PSW.

- A full color copy is produced according to the adjustment done in Step 9.
- The adjusting value entered in Step 9 is stored in memory. When the color balance setting is shifted towards the right side, the cyan density increases and the red density decreases. When the color balance setting is shifted towards the left side, the cyan density decreases and the red density increases.

⑩ Check the density in the cyan exposure level (cyan and red density) if it matches to the user's preference.
Repeat steps ⑧ through ⑩ until satisfactory result is obtained.

⑪ Push the CLEAR key twice to cancel the test command 53.

### f. Monochrome preset auto graphic copy mode copy density adjustment

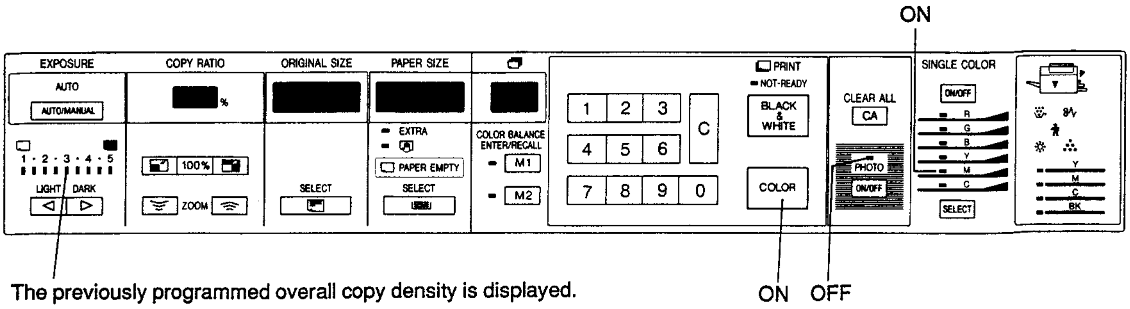
① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place a full color original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

④ Choose the magenta mode using the MONOCHROME copy select key.

- The MONOCHROME MAGENTA lamp turns on.
- The previously programmed overall copy density level is displayed in the density level indication window.


ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT
DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1
2
3
4
5
6
7
8
9
0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK
The previously programmed overall copy density is displayed.
ON
OFF

⑤ Choose the graphic copy mode using the photo mode select key. (The photo copy mode lamp turns off.)

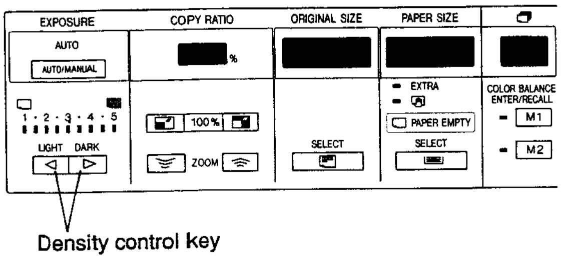
⑥ Push the COLOR PSW.

- A monochrome magenta copy is produced.

⑦ Check that the copy density level matches to the user's preference.

If the above condition is met, go to Step ⑪.

⑧ Enter a new copy density level using the copy density control key.


EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
Density control key

⑨ Push the COLOR PSW.

- A monochrome magenta copy is produced according to the adjustment done in Step ⑧.
- The adjusting value entered in Step ⑧ is set.

⑩ Check that the density level matches to the user's preference. Repeat steps ⑧ through ⑩ until satisfactory result is obtained.

⑪ Push the CLEAR key twice to cancel the test command 53.

## g. Monochrome preset auto photo copy mode copy density adjustment

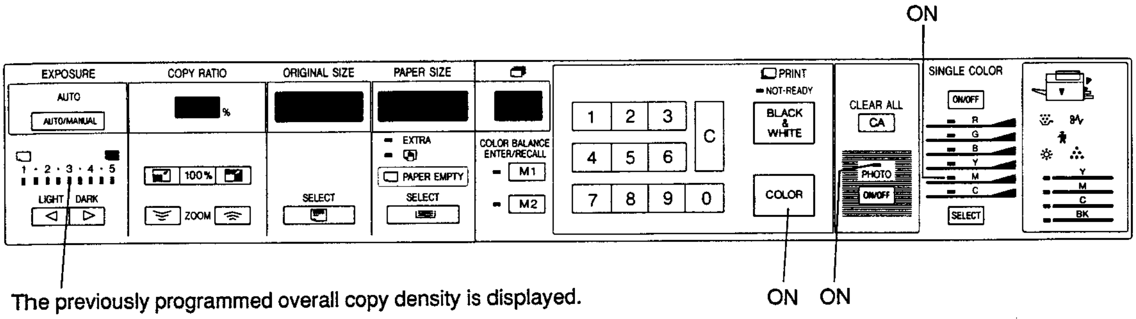
① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

② Place a full color original specified by the user on the original table.

③ Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

④ Choose the magenta mode using the MONOCHROME mode select key.

- The MONOCHROME MAGENTA lamp turns on.
- The previously programmed overall copy density level is displayed in the copy density level indication window.

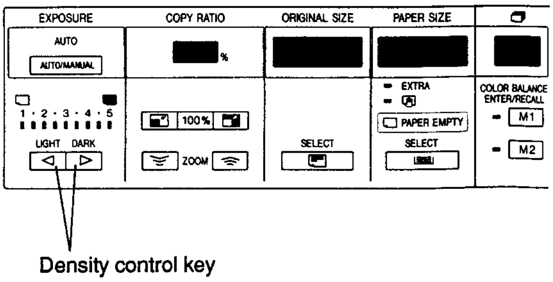

ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
PRINT
NOT-READY
1 2 3
4 5 6
7 8 9 0
C
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R G B Y M C
SELECT
Y M C BK
The previously programmed overall copy density is displayed.
ON ON

⑤ Push the COLOR PSW.

- A monochrome magenta copy is produced.

⑥ Check that the copy density matches to the user's preference. If the above condition is met, go to Step ⑩.

⑦ Enter a new copy density level using the density control key.


EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
Density control key

⑧ Push the COLOR PSW.

- A monochrome magenta copy is produced according to the adjustment done in Step ⑦.
- The adjusting value entered in Step ⑦ is set.

⑨ Check the copy density level if it matches to the user's preference. Repeat steps ⑦ through ⑨ until satisfactory result is obtained.

⑩ Push the CLEAR key twice to cancel test command 53.

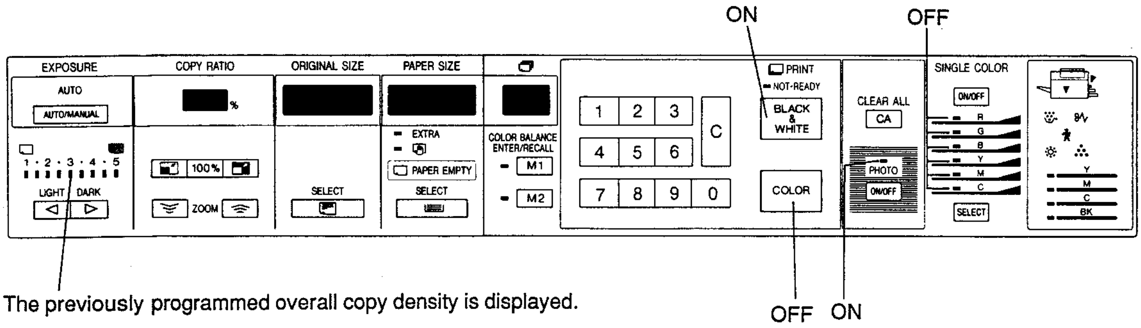
### h. Black and white preset auto photo copy mode copy quality adjustment

① Place a full color original specified by the user on the original table.

② Execute test command 53 (C → 0 → 0 → C → 5 → 3 → COLOR PSW).

③ Choose the black and white photo copy mode using the photo mode select key.

- The black and white ready lamp turns on.
- The color copy ready lamp turns off.
- The previously programmed overall copy density level is displayed in the copy density level indication window.
- All the monochrome lamps turn off.


ON
OFF
EXPOSURE
AUTO
AUTO/MANUAL
LIGHT
DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1
2
3
4
5
6
7
8
9
0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
BK
OFF
ON

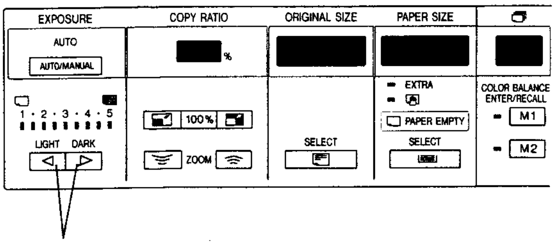
The previously programmed overall copy density is displayed.

④ Push the BLACK AND WHITE PSW.

- The screen is set.
- A black and white copy is produced.

⑤ Check that the copy density level matches the user's preference. If the above condition is met, go to Step ⑨.

⑥ Enter a new copy density level using the copy density control key.


EXPOSURE
AUTO
AUTO/MANUAL
LIGHT
DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2

Density control key

⑦ Push the BLACK AND WHITE PSW.

- A black and white copy is produced according to the adjustment done in Step ⑥.
- The adjusting value entered in Step ⑥ is stored in the memory.

⑧ Check that the copy density level matches the user's preference.

Repeat steps ⑥ through ⑧ until satisfactory result is obtained.

⑨ Push the CLEAR key twice to cancel the test command 53.

## (3) Auto copy mode copy quality adjustment

- The purpose of the auto copy mode copy quality adjustment is to set the automatic copy density control appropriate using the AE sensor.
- Test commands, 47, 51, 52, 55, and 63 are used for this adjustment.
- Adjustment must be done at 2 points mentioned in the table next.

### Adjusting points vs. adjustment steps

| Copy mode | | Adjusting color | Overall | | Individual color | | Ref. page |
|---|---|---|---|---|---|---|---|
| | | | Density | Contrast | Density | Contrast | |
| Full color | GR | Y | ① (a-①~⑯) | | | | 4-17 |
| | | M | | | | | |
| | | C | | | | | |
| | PH | Y | — | — | — | — | — |
| | | M | | | | | |
| | | C | | | | | |
| Monochrome | GR | M | — | — | — | — | |
| | PH | M | — | — | — | — | |
| Black and | GR | BK | ② (b-①~⑩) | — | — | — | 4-18 |

### a. Overall copy density level adjustment in the full color auto graphic copy mode

Test commands 52, 55, and 63 are used for this adjustment.

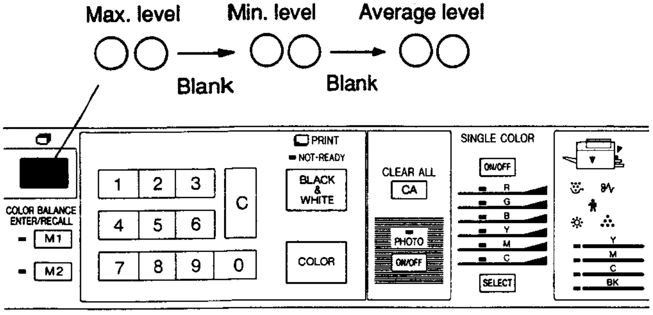
① Execute gamma correction.
(Execute test command 61. (C → 0 → 0 → C → 6 → 1 → COLOR PSW ON)

(Procedures ② through ⑪ are for setting the AE sensor limit level. If this setting has been properly made, no need to repeat the procedures.)

② Open the document cover. (This will simulate a black document placed on the table glaf.

③ Execute test command 55. (C → 0 → 0 → 5 → 5 → COLOR PSW)

- The copy lamp lights up, and the mirror base scans. The AE sensor output levels are displayed in the copy quantity indicator in the sequence of the max.level, min.level, and average level.

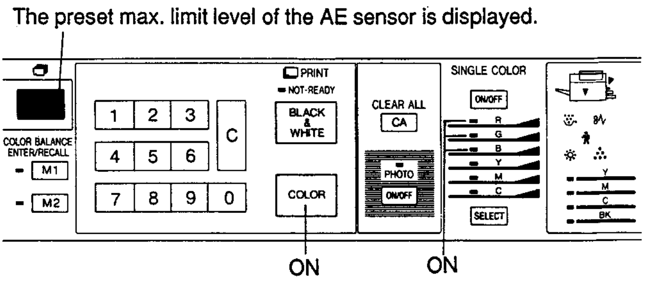

Max. level
Min. level
Average level
OO → OO → OO
Blank
Blank
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2

④ Memorize the average level of the AE sensor output. To execute test command 55 again, push the COLOR PSW again.

⑤ Push the CLEAR key twice to terminate test command 55.

⑥ Execute test command 52. (C → 0 → 0 → C → 5 → 2 → COLOR PSW)

- The color copy ready lamp lights up.
- Monochrome red, green, and blue lamps light up.
- The preset max. limit level of the AE sensor is displayed in the copy quantity indicator.


The preset max. limit level of the AE sensor is displayed.
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
ON

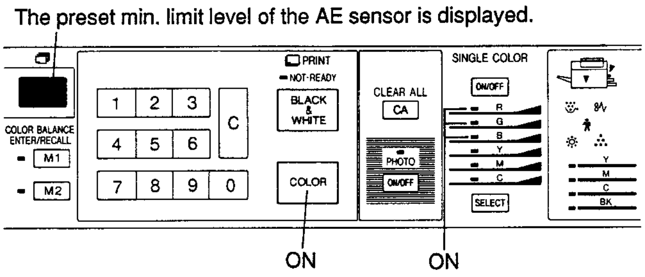
The preset Max. limit level of the AE sensor is displayed.

⑦ Enter 51 using the 10 key pad. (The AE sensor max. limit level is set to 51.)

- The entered AE sensor max. limit level (= 51) is displayed in the copy quantity indicator.

⑧ Turn on the COLOR PSW.

- The value entered in ⑦ is set in memory.
- The preset AE sensor min. limit level is displayed in the copy quantity indicator.


The preset min. limit level of the AE sensor is displayed.
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
ON
ON

⑨ Enter the value which is the sum plus of the average AE sensor output level memorized in ④ plus 3 using the 10 key pad.
(The average AE sensor output level + 3 = The set value of the min. limit level of the AE sensor)

- The min. limit level of the AE sensor entered with the 10 key pad is displayed in the copy quantity indicator.

⑩ Turn on the COLOR PSW.

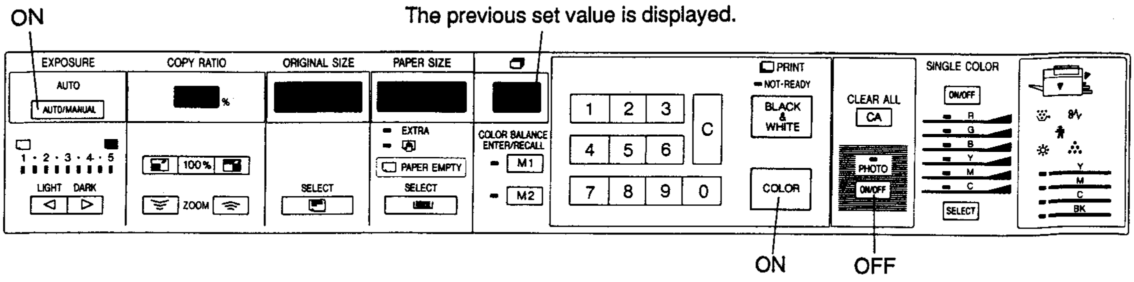
- The value in ⑨ is set in memory.

⑪ Push the CLEAR key twice to terminate test command 52.
(To execute the setting again, repeat procedures ⑥ through ⑪.)

⑫ Place a full color original specified by the user on the original table.

⑬ Execute test command 63 (C → 0 → 0 → C → 6 → 3 → COLOR PSW).

- The machine starts to warm up.
- The COLOR copy ready lamp turns on.
- The AUTO copy mode lamp turns on.
- The previously programmed adjust value is displayed in the copy number display window.


ON
The previous set value is displayed.
EXPOSURE
AUTO
AUTO/MANUAL
1 2 3 4 5
LIGHT DARK
COPY RATIO
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
SELECT
ON
OFF

⑭ Enter the adjust value "12" using the 10-key pad.

- The adjust value is displayed in the copy number display window.
  Entry of the adjust value "12" sets the overall copy density level in the full color photo auto copy mode to the standard level.
  Entry of a larger value increases the overall copy density. Entry of a smaller value decreases the overall copy density.
  The standard value is "12" and it can be set to 18 at a maximum and 2 at a minimum. Nothing changes even if the value is set to greater than 18 or less than 2.

(Note) If the overall copy density is set to the user's preference, some originals may not be copied in proper density.

⑮ Push the COLOR PSW.

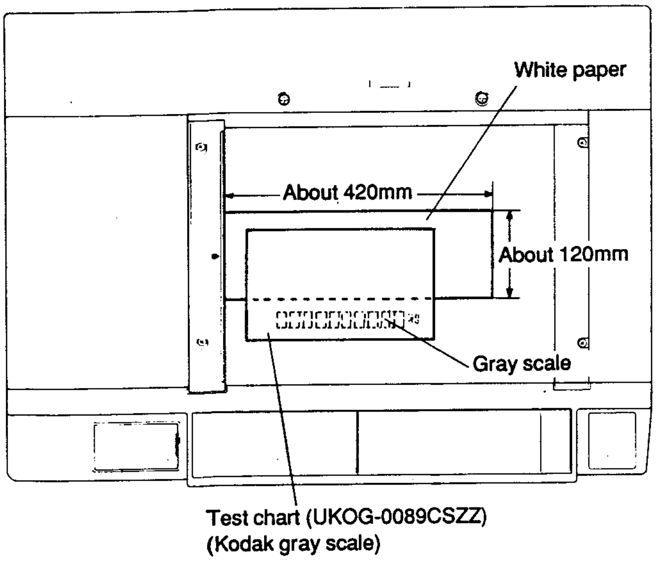
- A full color copy is produced according to the adjustment set in Step ⑭㉟
- The adjusting value entered in Step ⑭ is set in memory.

⑯ Push the CLEAR key twice to cancel the test command 63.

## b. Black-and-white graphic auto copy mode copy density adjustment

This adjustment is done using test commands 47 and 51.

① Place a sheet of 120mm wide, 420mm long, white paper (created by folding an A3 or 11" x 17" paper) on the original table in alignment to the center of the original table and place the test chart (FC2207TP1) or Kodak gray scale so that the gray scale portion does not overlap the white paper. Then, close the original cover.


White paper
About 420mm
About 120mm
Gray scale
Test chart (UKOG-0089CSZZ)
(Kodak gray scale)

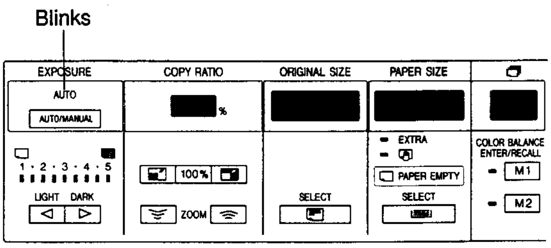
② Store the AE sensor output characteristics in memory. (Execute test command 47.)
If the operation is normal, it is not required to repeat this procedure again.

- The mirror base scans and the copy lamp applying voltage is changed from 80V (160V) to 40V (80V) in 5V (10V) step. The AE sensor output characteristics corresponding to the change in the copy lamp applying voltage (light quantity) are stored in memory.

③ Perform AE level adjustment.

a) Push the auto/manual density select key to set to the manual density mode (The auto copy density lamp turns off.)

b) Press again and hold the auto copy density select key for 5 sec.


Blinks
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2

- The auto copy density lamp blinks.
- The copy density level is set to "3".

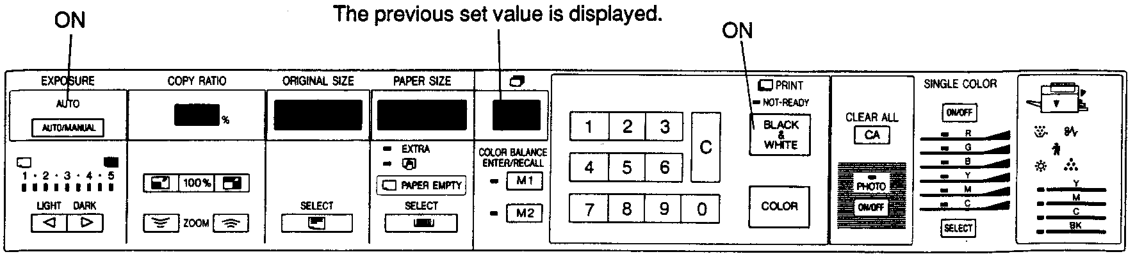
c) Push the density control key to adjust the auto density level.

- Press the "DARK" button to make a darker copy.
- Press the "LIGHT" button to make a lighter copy.

d) Push the auto/manual density select key to cancel the AE level mode.

④ Execute test command 51 (C → 0 → 0 → 5 → 1 → COLOR PSW)

- The previously programmed adjust value is displayed in the copy number display window.
- The machine starts to warm up.
- The BLACK AND WHITE ready lamp turns on.
- The AUTO COPY mode lamp turns on.


ON
The previous set value is displayed.
ON
EXPOSURE
AUTO
AUTO/MANUAL
1 · 2 · 3 · 4 · 5
LIGHT DARK
COPY RATIO
%
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R
G
B
Y
M
C
SELECT
Y
M
C
BK

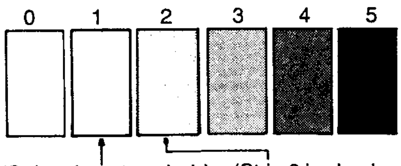
⑤ Push the BLACK AND WHITE PSW.

- A black and white copy is produced.

⑥ Check to see that the gray scale strip 1 is not copied, but the strip 2 is clearly copied.
If the above condition is satisfied, proceed to step ⑩.

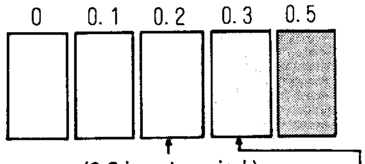
(Copy gray scale image)

[Kodak gray scale]



(Strip 1 is not copied.) (Strip 2 is clearly copied)

[UKOG-0089CSZZ]



(0.2 is not copied.)

(0.3 is clearly copied.)

⑦ Enter a new adjust value.

- The adjust value is displayed in the copy number display window.
  Entry of a larger value increases the exposure level and decreases the copy density. Entry of a smaller value decreases the exposure level and increases the copy density.

⑧ Push the BLACK AND WHITE PSW.

- A black-and-white copy is produced according to the adjustment performed in Step ⑦.
- The adjusting value entered in Step ⑦ is set.

⑨ Check to see that the gray scale strip 1 is not copied but the strip 2 is clearly copied.

Repeat Steps ⑦ through ⑨ until the satisfactory result is obtained.

⑩ Push the CLEAR key twice to cancel test command 51.

## (Reference)

Image forming process in the slide copy mode

The image forming process in the slide copy mode differs from the normal copy image forming process only in the full color mode. (Only the process relating to the optical system is different.)

In the case of normal copy in the full color photo mode, proper copy image is formed with the copy lamp voltage for low density (LD) image area and the copy lamp voltage for high density (HD) image area. (The two copy lamp voltages are separately set.)

In the slide copy mode, however, there is no communication circuit of image data, and therefore, slide projector lamp light quantity cannot be changed.

Therefore, in the CX-7700 full color photo mode copy with a slide projector, the main corona grid voltage in the process side is changed when forming image in LD and HD areas so that proper image can be obtained even with the slide projector lamp light quantity.

| Copy mode | High density image area (HD) | Low density image area (LD) |
|---|---|---|
| Normal full color photo mode | Monochrome photo mode grid voltage –20V (DC–225V) | Monochrome photo mode grid voltage –70V (DC–175V) |
| Full color photo mode with slide projector | Monochrome photo mode grid voltage –50V (DC–195V) | Monochrome photo mode grid voltage (DC–245V) |

Each voltage is set with the main corona grid voltage output as a reference.
(Monochrome photo mode grid voltage = DC–245V)
* For exposure adjustment of the slide projector, refer to the CX-7SP1 Service Manual.

# [5] COPY PROCESS

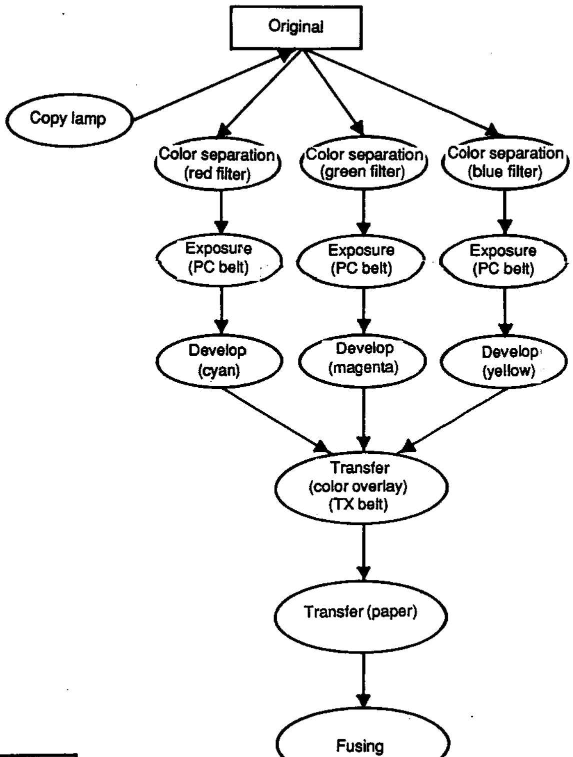
## 1. General

This model uses dry electrostatic, plain paper copy technology incorporating the subtractive color process technology.

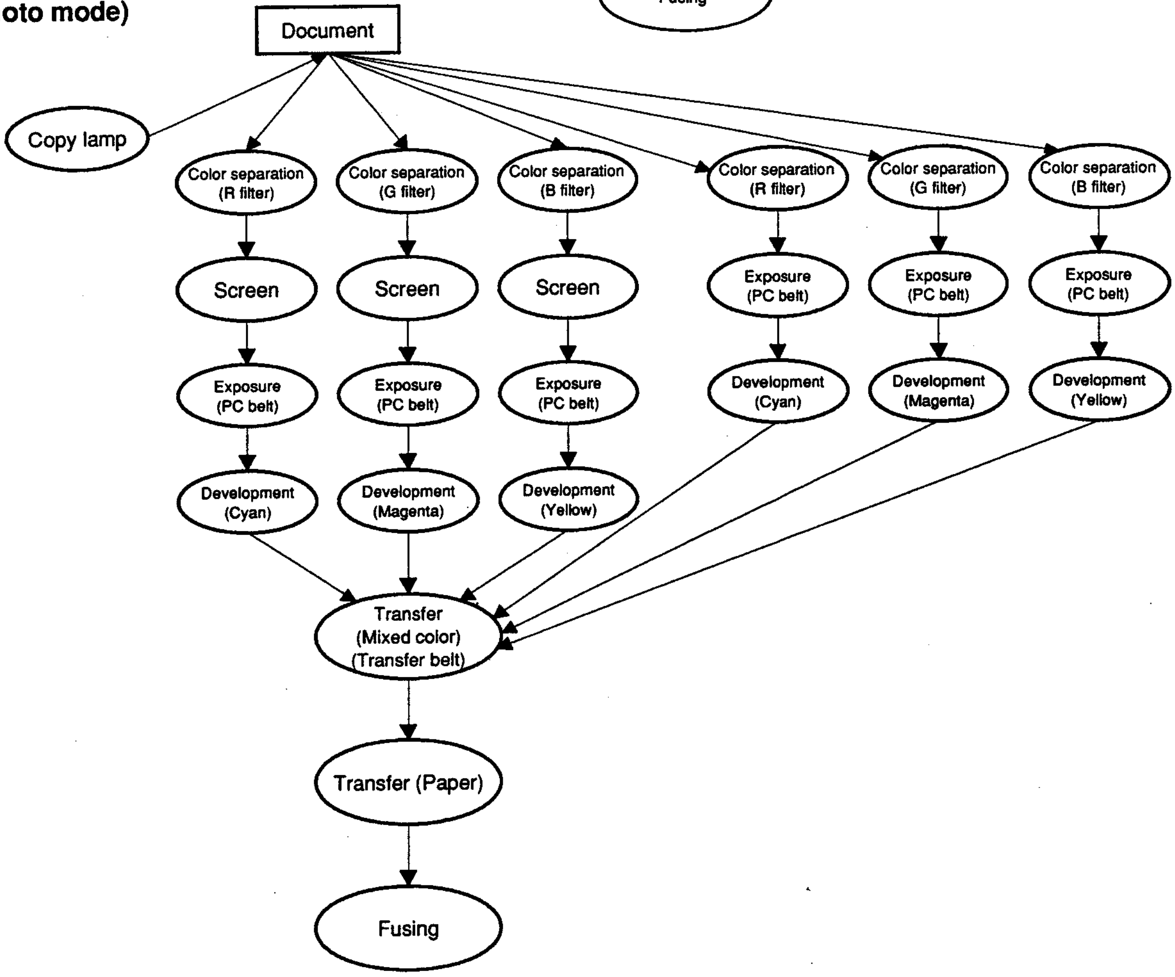
The following diagrams give brief explanations.

### A. Full color copy mode

**(Graphic mode)**

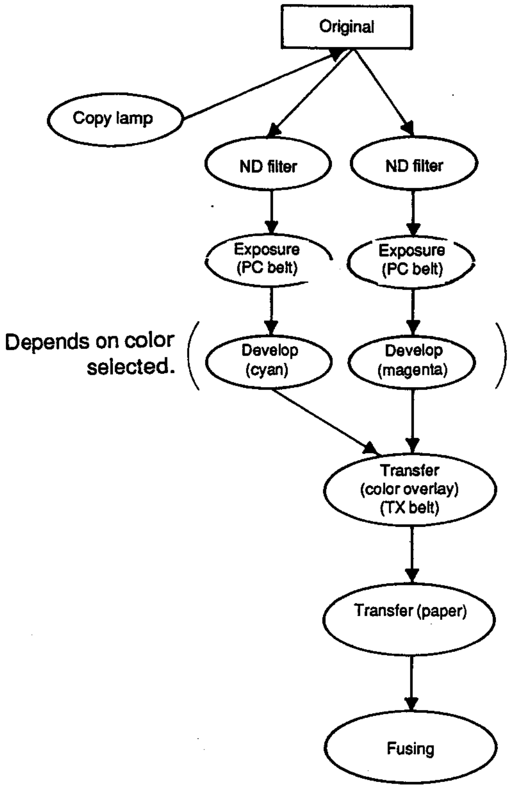

Original
Copy lamp
Color separation (red filter)
Color separation (green filter)
Color separation (blue filter)
Exposure (PC belt)
Exposure (PC belt)
Exposure (PC belt)
Develop (cyan)
Develop (magenta)
Develop (yellow)
Transfer (color overlay) (TX belt)
Transfer (paper)
Fusing

**(Photo mode)**

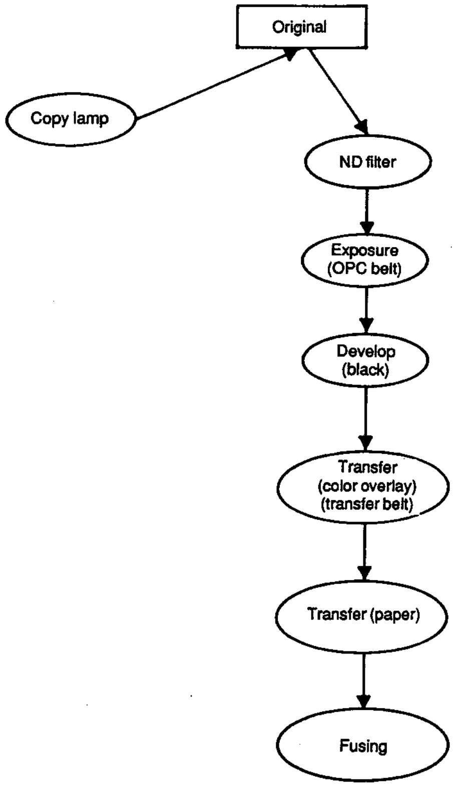

Document
Copy lamp
Color separation (R filter)
Color separation (G filter)
Color separation (B filter)
Color separation (R filter)
Color separation (G filter)
Color separation (B filter)
Screen
Screen
Screen
Exposure (PC belt)
Exposure (PC belt)
Exposure (PC belt)
Exposure (PC belt)
Exposure (PC belt)
Exposure (PC belt)
Development (Cyan)
Development (Magenta)
Development (Yellow)
Development (Cyan)
Development (Magenta)
Development (Yellow)
Transfer (Mixed color) (Transfer belt)
Transfer (Paper)
Fusing

## B. Monochrome copy mode

(Ex): In the case of blue copy


Original
Copy lamp
ND filter
ND filter
Exposure (PC belt)
Exposure (PC belt)
Depends on color selected.
Develop (cyan)
Develop (magenta)
Transfer (color overlay) (TX belt)
Transfer (paper)
Fusing

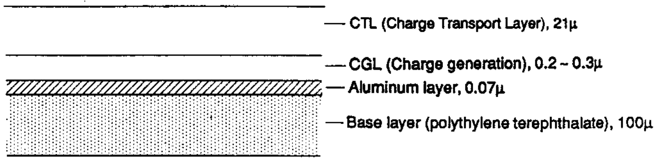
## C. Black and white copy mode


Original
Copy lamp
ND filter
Exposure (OPC belt)
Develop (black)
Transfer (color overlay) (transfer belt)
Transfer (paper)
Fusing

## 2. Phoconductor

- An OPC (Organic photoconducter) belt is used as the photoconductor.

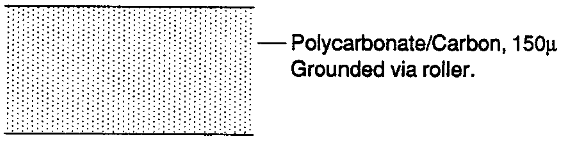
(Structure of OPC layers)


CTL (Charge Transport Layer), 21μ
CGL (Charge generation), 0.2 ~ 0.3μ
Aluminum layer, 0.07μ
Base layer (polythylene terephthalate), 100μ

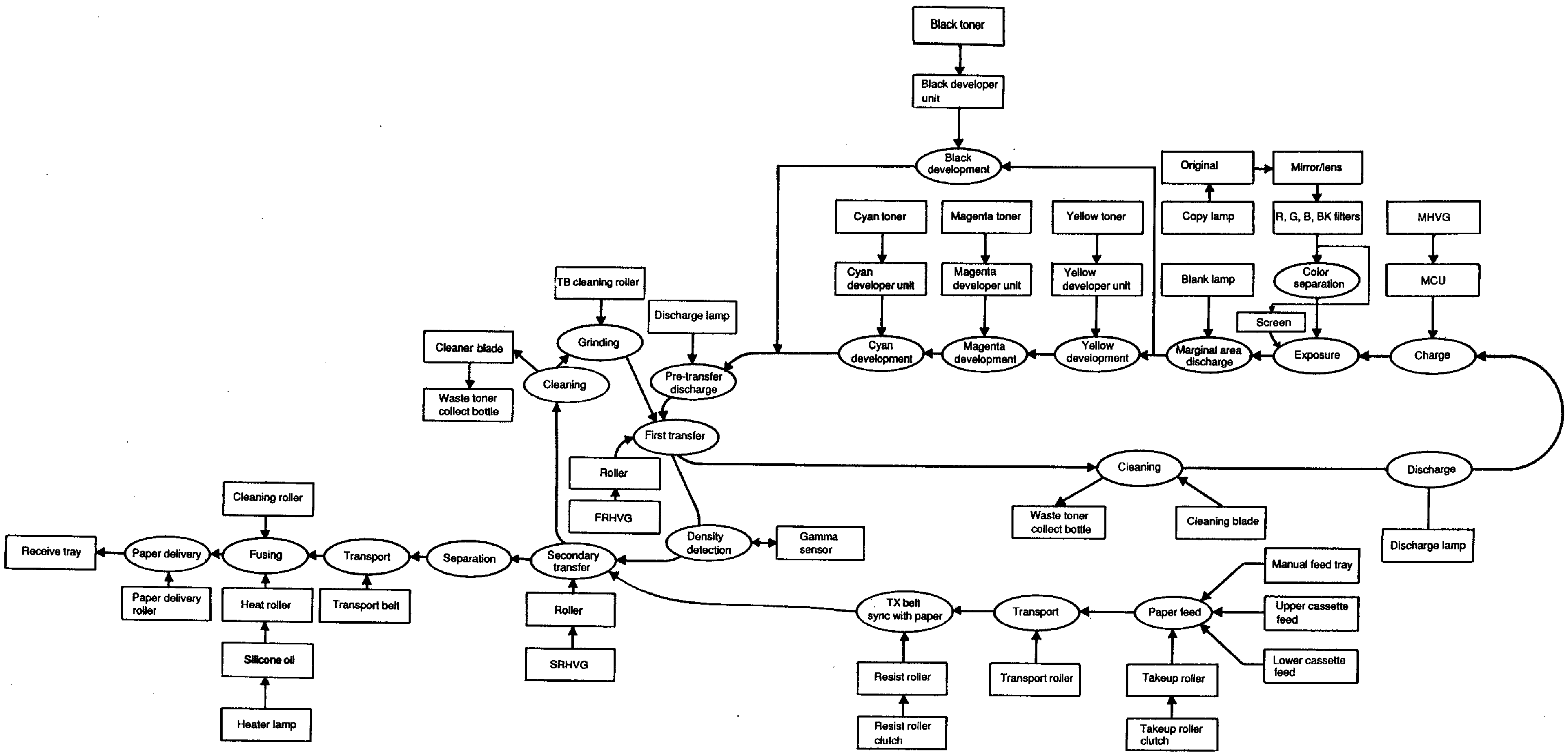
## 3. Image transfer media

- Toner on the PC is not directly transfered to the copy paper, but transfered to the transfer media (TX belt) before being transfered on paper. Because three colored toners could not be overlaid on the same PC at one time, individual toned images are overlaid on the TX belt. A polycarbonate belt is used for the transfer media.

(Structure of transfer media)


Polycarbonate/Carbon, 150μ
Grounded via roller.

# 4. Copy process diagram


Black toner
Black developer unit
Black development
Original
Mirror/lens
Copy lamp
R, G, B, BK filters
MHVG
Cyan toner
Magenta toner
Yellow toner
Cyan developer unit
Magenta developer unit
Yellow developer unit
Blank lamp
Color separation
MCU
Screen
TB cleaning roller
Discharge lamp
Grinding
Cleaner blade
Cleaning
Waste toner collect bottle
Pre-transfer discharge
Cyan development
Magenta development
Yellow development
Marginal area discharge
Exposure
Charge
First transfer
Roller
FRHVG
Cleaning
Discharge
Waste toner collect bottle
Cleaning blade
Discharge lamp
Cleaning roller
Receive tray
Paper delivery
Fusing
Transport
Separation
Secondary transfer
Density detection
Gamma sensor
Manual feed tray
Paper delivery roller
Heat roller
Transport belt
Roller
TX belt sync with paper
Transport
Paper feed
Upper cassette feed
Silicone oil
SRHVG
Resist roller
Transport roller
Takeup roller
Lower cassette feed
Heater lamp
Resist roller clutch
Takeup roller clutch

## 5. Copy process in general

Color contents of the original are separated into three primary colors of red, green, and blue using filters. The unexposed portion by the OPC is toned with its complimentary color pigment (yellow for blue, magenta for green, or cyan for red), respectively, to reproduce the original colors. This is the method what we call the subtractive color process.

Areas not containing the red element are toned with cyan pigment (red light absorbed)

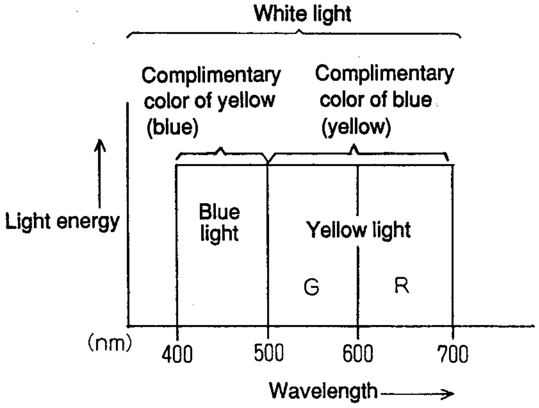
Areas not containing the green element are toned with magenta pigment (green light absorbed)

Areas not containing the blue element are toned with yellow pigment (blue light absorbed)

### A. Complimentary color

A complimentary color is the color required to make white when added to the color in question.

White light (400 ~ 700nm) – blue (400 ~ 500nm) = yellow (500 ~ 700nm)(complimentary color)



Pigment of a certain complimentary color has the property to absorb the light of the respective color.

Relationship color vs. complimentary color

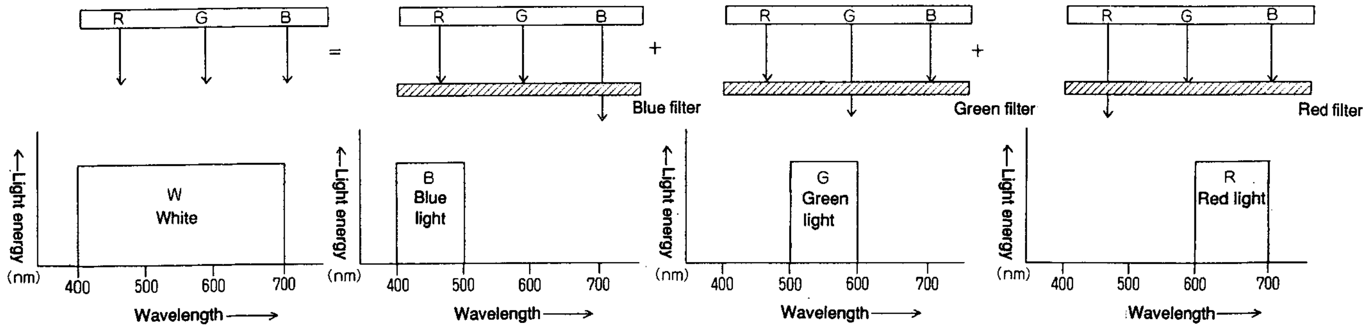
| Color | Complimentary color |
|---|---|
| R (W – C) | C (W – R) |
| G (W – M) | M (W – G) |
| B (W – Y) | Y (W – B) |
| Y (W – B) | B (W – Y) |
| M (W – G) | G (W – M) |
| C (W – R) | R (W – C) |
| W (W – BK) | BK (W – W) |
| BK (W – W) | W (W – BK) |

### B. Color separation

Color separation is the process of separating the colors on an original into the three primary colors of red, green, and blue using filters of the same colors.

The red filter transmits only the red component, the green filter only the green component, and the blue filter only the blue component of the original.

Original (Color) Light



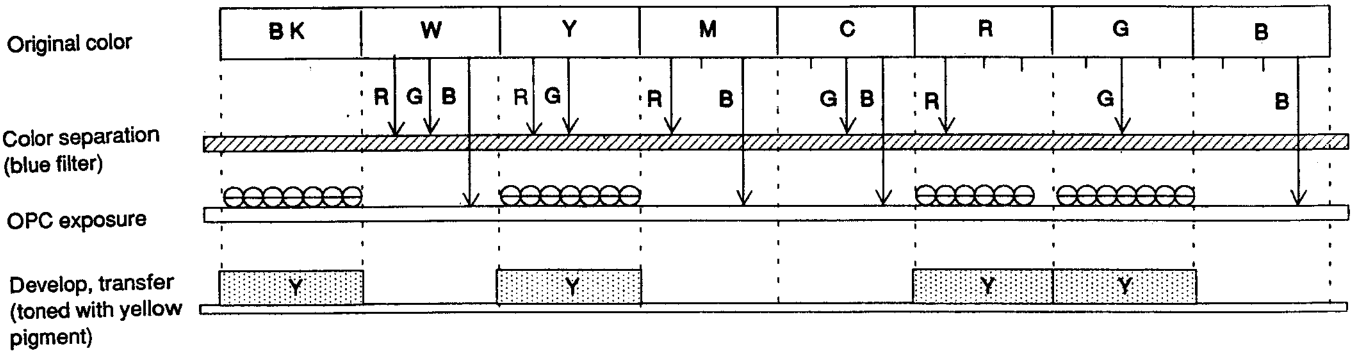
### C. Full color mode copy process

The original is scanned and separated into the three primary colors of red, green, and blue using filters of the same colors. The area not containing red is toned with its complimentary color pigment (cyan), the area not containing green is toned with its complimentary color pigment (magenta), and the area not containing blue is toned with its complimentary color pigment (yellow).

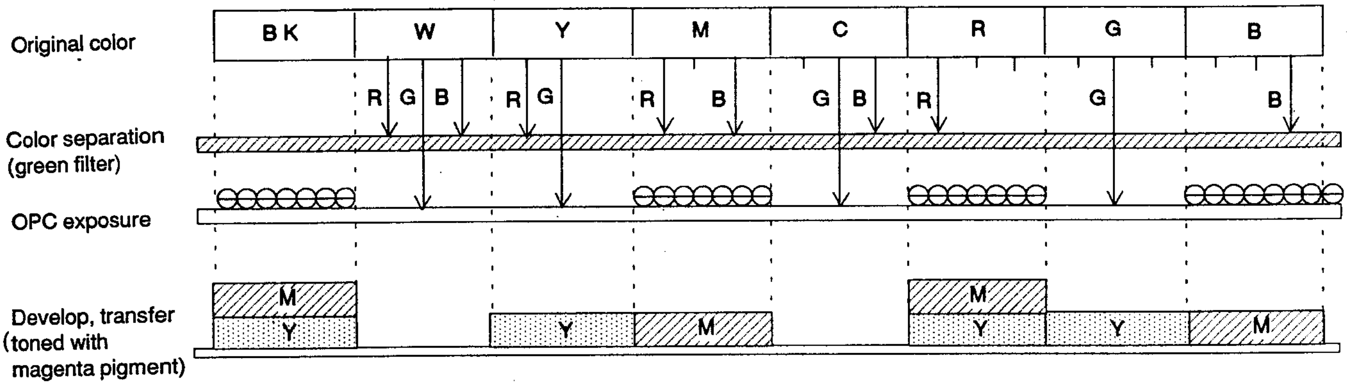
In this case, less toner is attached to the area dense with filtered color and more toner is attached to the area weak with filtered color. In other words, an original with light color is less toned with the toner, and original with dark color is more toned with the toner.

## Color separation

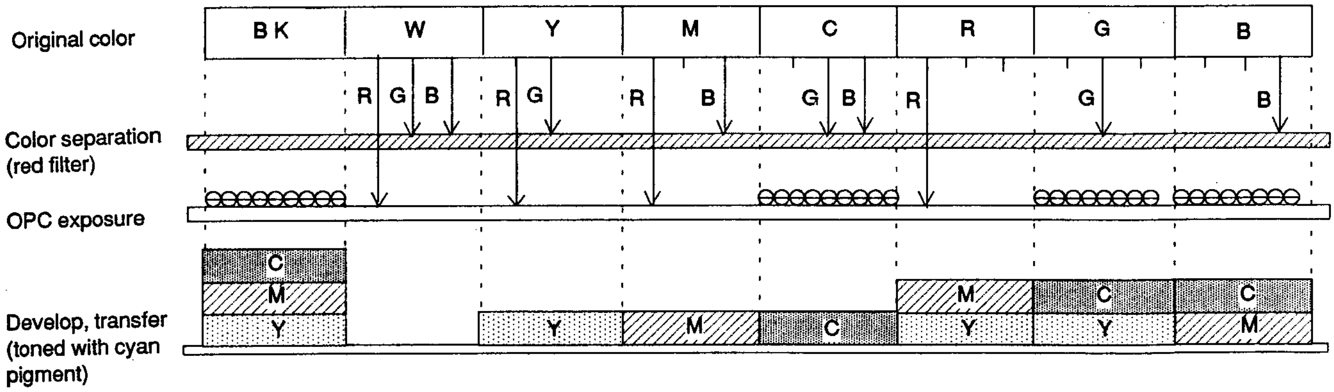
(1) The original is scanned with the blue filter and the image area not exposed by blue is toned with yellow pigment. Blue is therefore absorbed from these arears of the final copy.


Original color
BK
W
Y
M
C
R
G
B
R G B
Color separation (blue filter)
OPC exposure
Develop, transfer (toned with yellow pigment)
Y

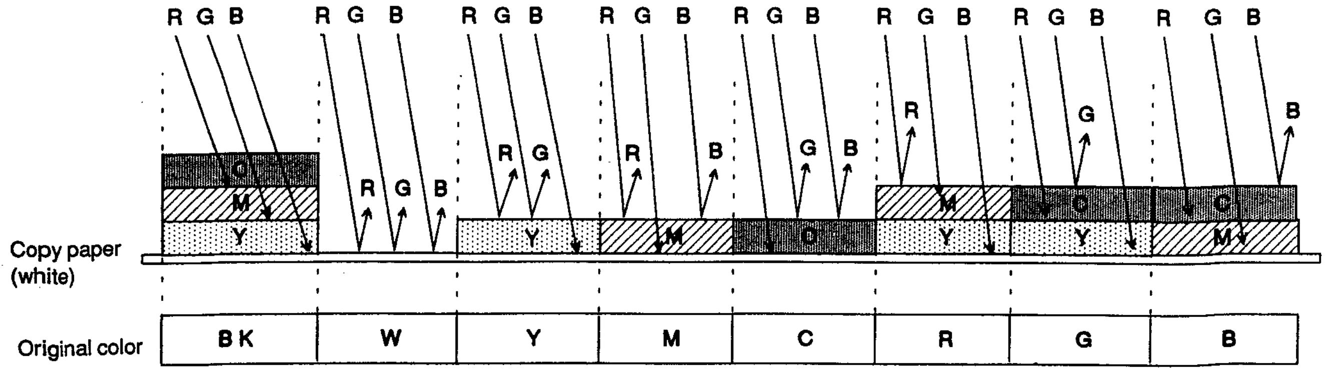
(2) The original is scanned with the green filter and the image area not exposed by green is toned with magenta pigment.


Original color
BK
W
Y
M
C
R
G
B
R G B
Color separation (green filter)
OPC exposure
Develop, transfer (toned with magenta pigment)
M
Y

(3) The original is scanned with the red filter and the image area not exposed by red is toned with cyan pigment. Red is therefore absorbed from these areas of the final copy.


Original color
BK
W
Y
M
C
R
G
B
R G B
Color separation (red filter)
OPC exposure
Develop, transfer (toned with cyan pigment)
C
M
Y

Reproduction (copy image)


R G B
C
M
Y
Copy paper (white)
Original color
BK
W
Y
M
C
R
G
B

| Original | | Copy | | |
|---|---|---|---|---|
| Color on original (light components) | Color not on original (light components) | Color not on original (light components) Pigment of complimentary color | Absorbed light | Reflected light |
| Y (Yellow) (G + R) | B (Blue) | Y (Yellow) | B (Blue) | Y (Yellow) (G + R) |
| M (Magenta) (B + R) | G (Green) | M (Magenta) | G (Green) | M (Magenta) (B + R) |
| C (Cyan) (B + G) | R (Red) | C (Cyan) | R (Red) | C (Cyan) (B + G) |
| R (Red) | C (Cyan) (B + G) | R (Red) (Y + M) | C (Cyan) (B + G) | R (Red) |
| G (Green) | M (Magenta) (B + R) | G (Green) (Y + C) | M (Magenta) (B + R) | G (Green) |
| B (Blue) | Y (Yellow) (G + R) | B (Blue) (M + G) | Y (Yellow) (G + R) | B (Blue) |
| BK (Black) (none) | R, G, B | Y, M, C | R, G, B | None |
| W (White) (R + G + B) | | | None | R, G, B |

The cyan pigment that absorbs red is applied to the area not exposed by red. The magenta pigment that absorbs green is applied to the area not exposed by green. The yellow pigment that absorbs blue is applied to the area not exposed by blue.

Light components not existing in the original (colors) are absorbed by a combination of yellow, magenta, and cyan pigments. The colors in the original are reproduced by adjusting the light components which are reflected from the copy paper.

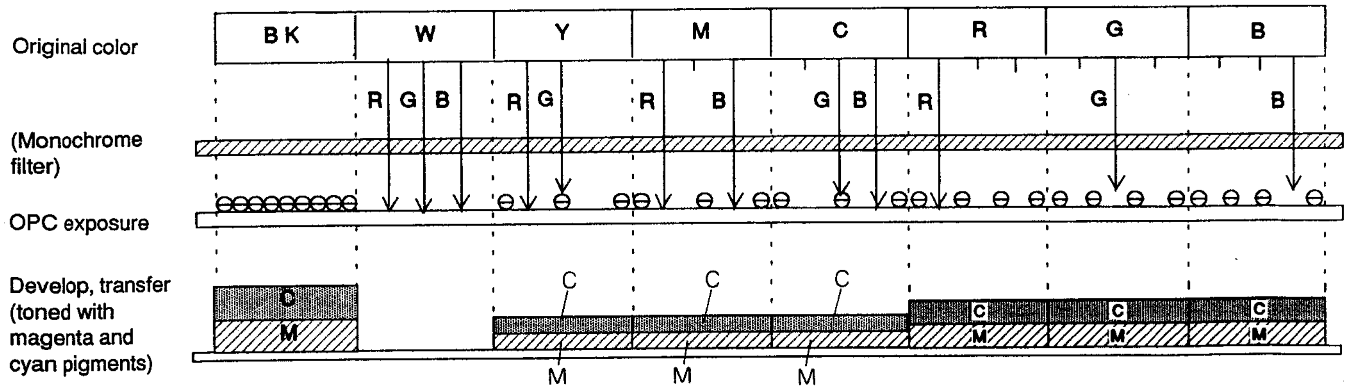
A dark original means that it has less light reflected. In this case, the original is toned with more pigments of the complimentary colors.

## D. Monochrome copy mode process

In this mode, color separation is not necessary. The monochrome filter is used. The image is toned with pigments so as to assume the specific color.

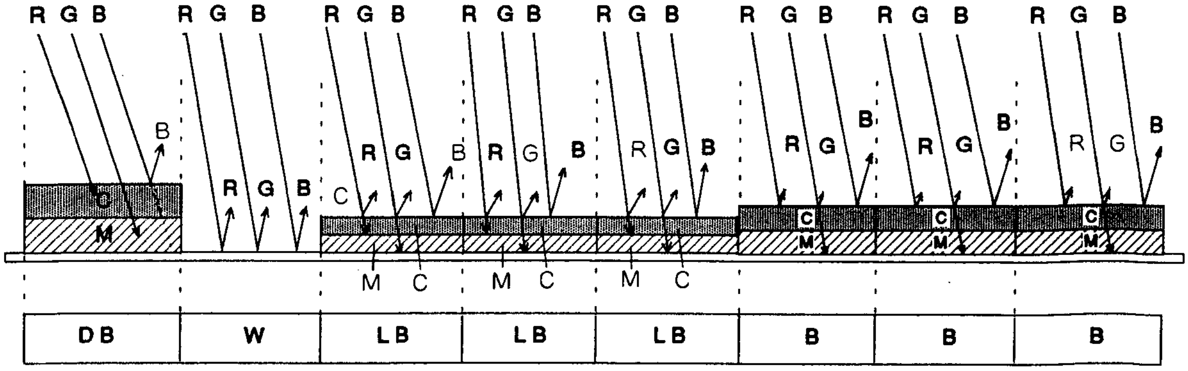
In this case, less pigments are used for the area of the original where colors are distinctive, and more pigments are used for the area of the original where dark colors are existing.

(Example) Monochrome copy of blue



Original color
BK
W
Y
M
C
R
G
B
R G B
R G
R B
G B
R
G
B
(Monochrome filter)
OPC exposure
Develop, transfer (toned with magenta and cyan pigments)
C
M
C
C
C
M
M
M
C
M
C
M
C
M

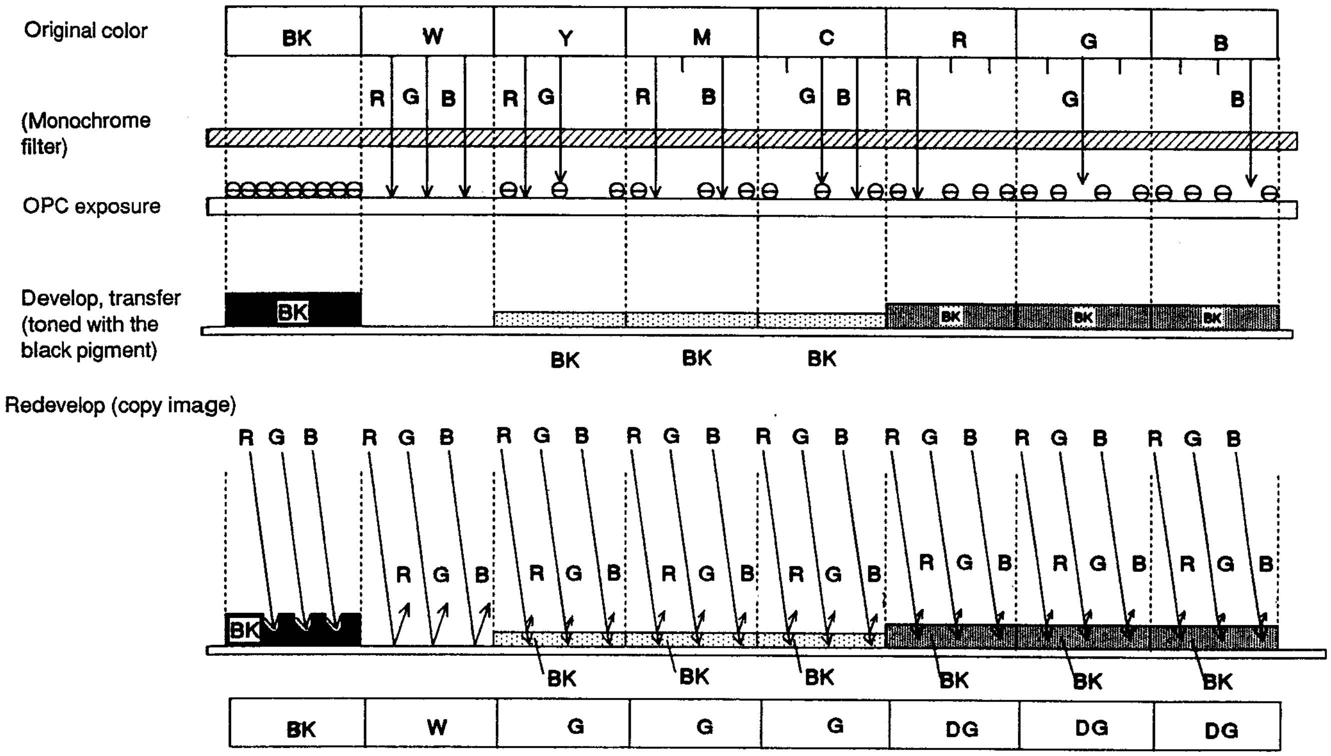
Redevelop (copy image)



R G B
R G B
R G B
R G B
R G B
R G B
R G B
R G B
B
C
M
R G B
C
R G B
R G B
R G B
M C
M C
M C
R G B
C
M
R G B
C
M
R G B
C
M
DB
W
LB
LB
LB
B
B
B

## E. Black and white copy mode process

In the black and white copy mode, color separation is not necessary. The monochrome filter is used and the image area is toned with the black pigment. In this case, only the black pigment is used. Less black pigment is used for the area of high light reflectivity (red, green, blue). On the other hand, much black pigments are applied to the area consisting of low light reflectivity (red, green, blue). That is, less black pigment is used for light areas and more pigment is used for dark areas.


Original color
BK
W
Y
M
C
R
G
B
(Monochrome filter)
OPC exposure
Develop, transfer (toned with the black pigment)
Redevelop (copy image)
R G B
BK
BK
W
G
G
G
DG
DG
DG

BK: Black
DG: Drak gray
G: Gray

## 6. Copy process description (In full color copy mode)

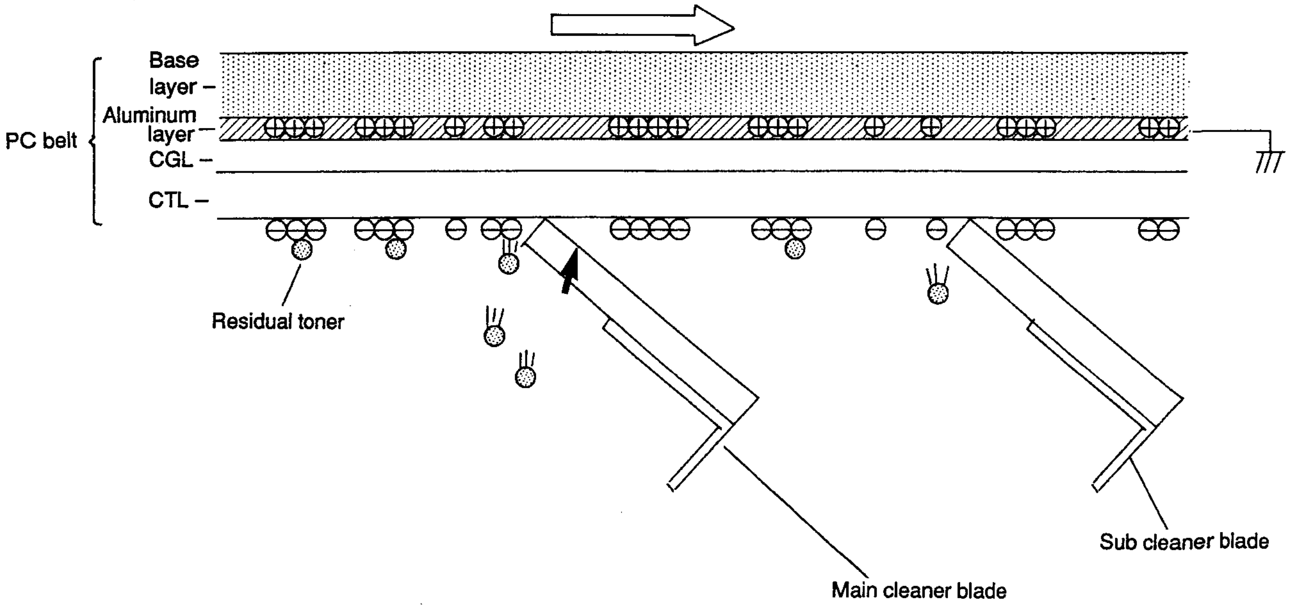
STEP 1: Power on./Cleanining process

DVM on DMC and DMGC (YMCB) pulsed

STEP 2: PC/TX belt motor is energized.
PC belt and TX belt begin to rotate.

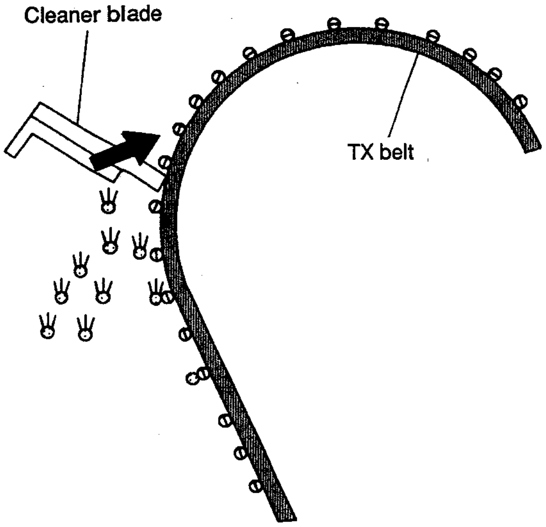
STEP 3: PC belt cleaning
PBCS is turned on.
The main cleaner blade is brought into close contact with the PC belt.
(The sub cleaner blade is always in close contact with the PC belt.)

Residual toner on the PC belt is cleaned by the cleaner blades. The waste toner collected is then sent to the waste toner collection bottle by means of the waste toner transport screw.


PC belt
Base layer
Aluminum layer
CGL
CTL
Residual toner
Main cleaner blade
Sub cleaner blade

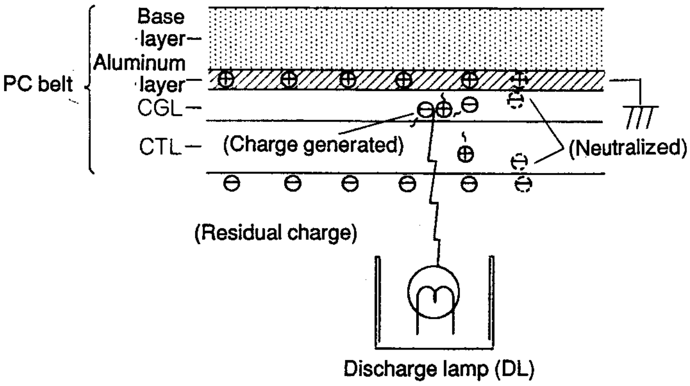
STEP 4: TX belt cleaning
TBCS is turned on.
The cleaner blade is brought into close contact with the TX belt.

Residual toner on the TX belt is cleaned by the cleaner blade. The waste toner is sent to the waste toner collection bottle using the waste toner transport.screw.


Cleaner blade
TX belt

STEP 5: PC belt is discharged.
Blank lamps, discharge lamp, and pre-transfer discharge lamp are energized.

By exposing the PC belt to light from the discharge lamp, positive and negative charges appear in the PC belt CGL. The negative charge produced in CGL moves towards the positive charge within the aluminum layer OPC surface residual charge is eliminated. The positive charge and negative charge inside the aluminum layer and the PC belt surface respectively nullify each other. The charge on the surface of the PC belt is lost and the PC belt surface potential becomes almost 0V.


PC belt
Base layer
Aluminum layer
CGL
CTL
(Charge generated)
(Neutralized)
(Residual charge)
Discharge lamp (DL)

STEP 6: PC belt is charged.
MHVG is energized.
MHVG grid is energized.

An even negative charge is given to the surface of the PC belt by the negative corona of the main corona. The surface potential of the PC belt is regulated to a potential equal to the grid potential as controlled by the screen grid.

(The grid has the following functions)

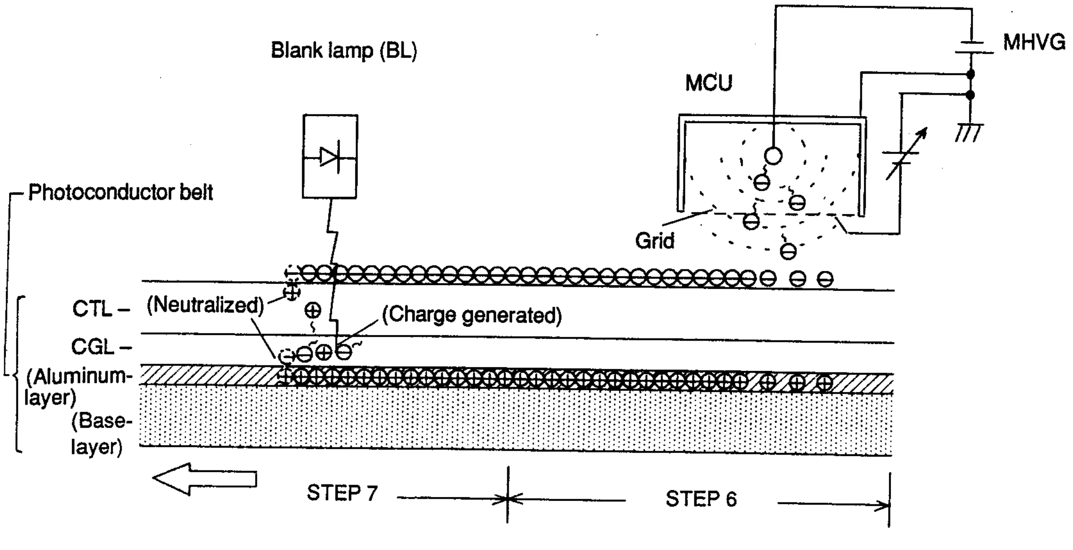
- When the PC belt surface potential is less than the grid potential:

The charge generated by corona goes through the screen grid to charge the drum.

- When the PC belt surface potential is greater than the grid potential:

The charge generated by corona goes to ground via the grid potential output of the high voltage unit.

Therefore the OPC surface potential becomes almost equal to the grid potential. Governing of the PC belt surface potential is easily controlled by changing the grid voltage.


Blank lamp (BL)
MCU
MHVG
Grid
Photoconductor belt
CTL
(Neutralized)
(Charge generated)
CGL
(Aluminum-layer)
(Base-layer)
STEP 7
STEP 6

STEP 7: PC belt discharge

OPC discharge is performed immediately after charge is made when the blank lamps are active. As the light from the discharge lamp is exposed over the PC belt, positive and negative charges are generated in the CGL of the PC belt. The negative charge moves towards the positive charge within the aluminum layer generated at STEP 6, while the positive charge moves towards the negative charge of the PC belt surface. In the aluminum layer and the PC belt surface, negative charges and positive charges neutralize each other and the charge in the PC belt surface becomes almost 0V.

STEP 8: DV motor is energized.

Yellow toner/developer is stirred.

Developer bias voltage (DC −60V) is supplied.

Yellow stirring clutch (DMCY) is energized.

Yellow developer clutch (DMGCY) is energized.

Heater lamp is energized.

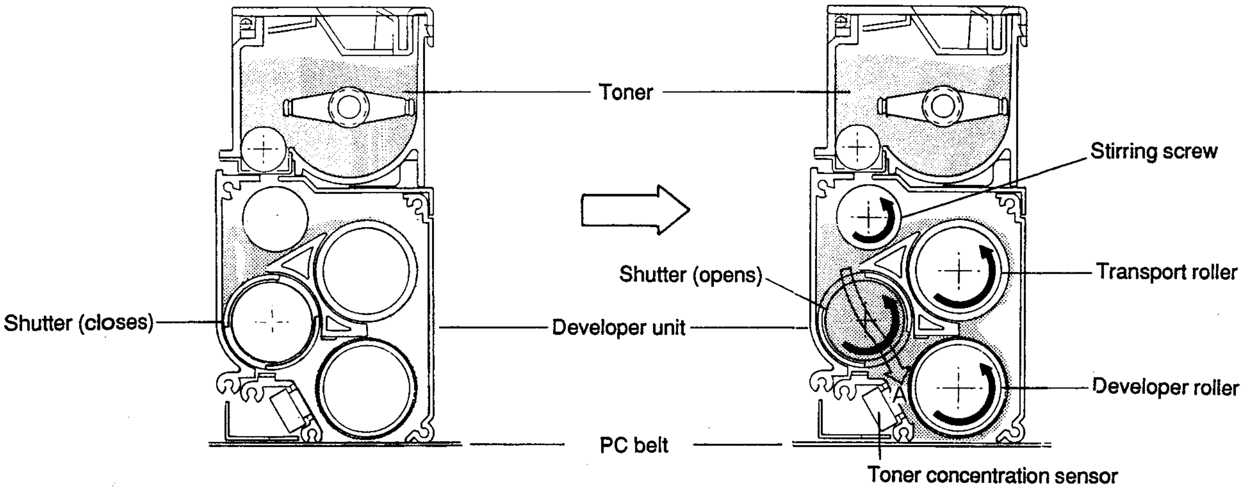
Yellow toner density is detected.

Yellow shutter (DSCY pulsed) opens.

(In the case of undertoner, toner is replenished (TMY is turned on.)

The developer unit stirring clutch and the developer clutch are turned on. The stirring screw and the developer roller begin to rotate, and the toner and developer supply route (arrowhead A) is opened.

(Toner and developer stirred and toner density sensed)


Toner
Stirring screw
Shutter (opens)
Transport roller
Shutter (closes)
Developer unit
Developer roller
A
PC belt
Toner concentration sensor

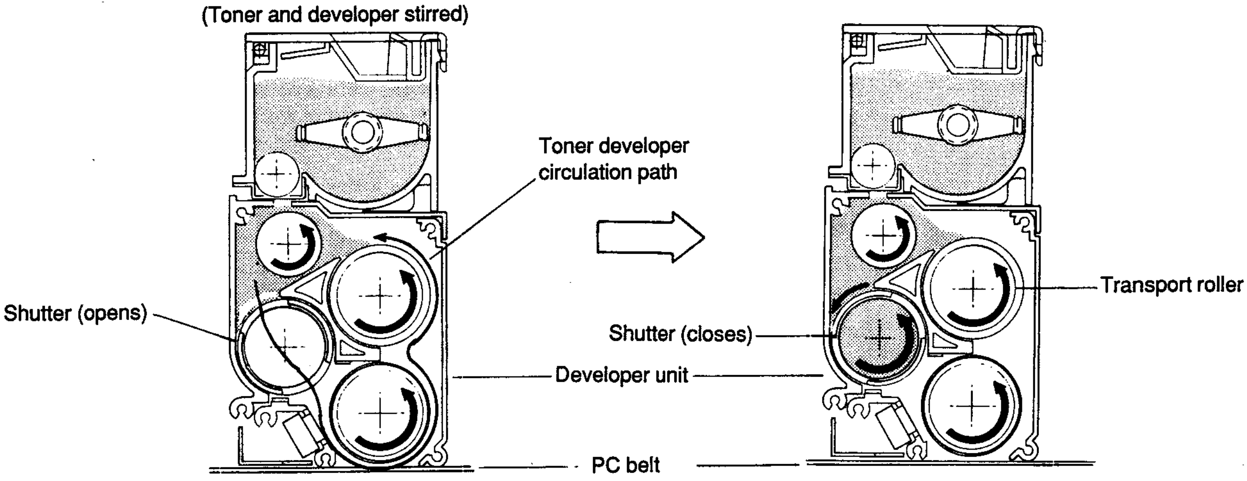
STEP 9: The heat roller begins to rotate (PF motor is turned on).

STEP 10: Developer and toner on the yellow developer roller are cleaned.

Yellow developer clutch (DMGCY) is turned off.

Yellow shutter closes (DSCY pulsed).

(Toner and developer stirred)


Toner developer circulation path
Shutter (opens)
Transport roller
Shutter (closes)
Developer unit
PC belt

While the developer roller is running, the developer unit shutter closes, and the toner and developer supply route is closed. The toner and developer on the developer roller are attracted to the transport roller which cleans the toner and developer from the developer roller.

STEP 11: Cleaning of the developer and toner from the yellow developer roller is completed.

Yellow stirring clutch (DMCY) is turned off.

STEP 12: Magenta toner is stirred.

Magenta stirring clutch (DMCM) is turned on.

Magenta developer clutch (DMGCM) is turned on.

Magenta toner density is detected.

Magenta shutter (DSCM ON) is opened.

(In the case of low toner density, the toner is replenished (TMM is turned on.)). (Similar as STEP 8.)

STEP 13: The developer and toner on the magenta developer roller are cleaned.

Magenta developer clutch (DMGCM) is turned off.

Magenta shutter (DSCM pulsed) closes.

(Similar as STEP 10.)

STEP 14: Cleaning of the developer and toner from the magenta developer roller is completed.

Magenta stirring clutch (DMCM) is turned off.

STEP 15: Cyan toner is stirred.

Cyan stirring clutch (DMCM) is turned on.

Cyan developer clutch (DMGCM) is turned on.

Cyan toner concentration is detected.

(In the case of low toner density, the toner is replenished (TMC is turned on.)).

Cyan shutter (DSCC pulsed) is opened.

(Similar as STEP 8.)

STEP 16: The developer and toner on cyan developer roller are cleaned.

Cyan developer clutch (DMGCC) is turned off.

Cyan shutter (DSCC pulsed) is closed.

(Similar as STEP 10.)

STEP 17: Cleaning of the developer and toner from the cyan developer roller is completed.

Cyan developer stirring clutch (DMCC) is turned off.

STEP 18: Black toner is stirred.

Black stirring clutch (DMCBK) is turned on.

Black developer clutch (DMGCBK) is turned on.

Black toner density is detected.

Black shutter (DSCBK pulsed) openes.

(In the case of low toner density, the toner is replenished (TMBK is turned on.)).

(Similar as STEP 8.)

STEP 19: The developer and toner on the black developer roller are cleaned.

Black stirring clutch (DMGCBK) is turned off.

Black shutter (DSCBK pulsed) is closed.

(Similar as STEP 10.)

STEP 20: Cleaning of the developer and the toner on the black developer roller is completed.

Black stirring clutch (DMCBK) is turned off.

STEP 21: PC belt discharge

The blank lamps, discharge lamps, and pre-transfer discharge lamps are energized.

Reference (similar as STEP 5.)

Synchronization of the PC belt and the TX belt is completed.

If the toner concentration and the heat roller temperature are proper. (The gamma correction process will begin).

STEP 22: Cleaning → Gamma correction process

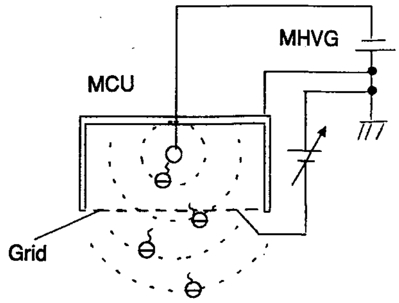
Electrostatic latent image patch is formed for yellow toner.

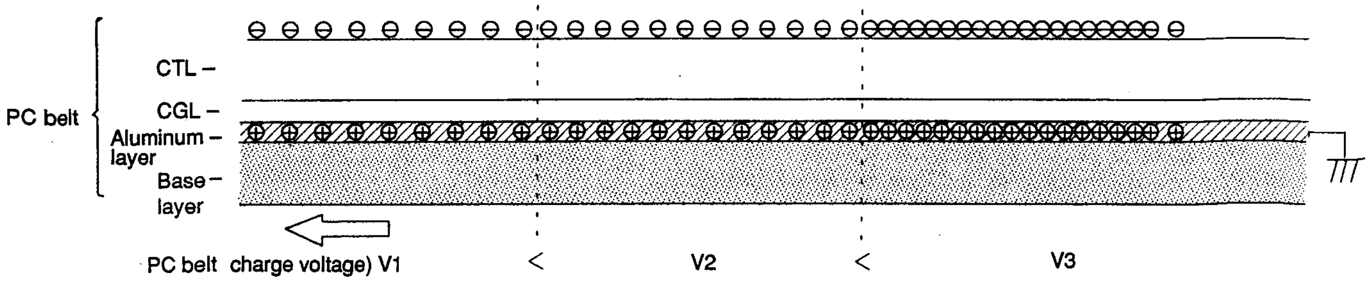
PC belt is charged.

MHVG is turned on.

MHVG grid is turned on.

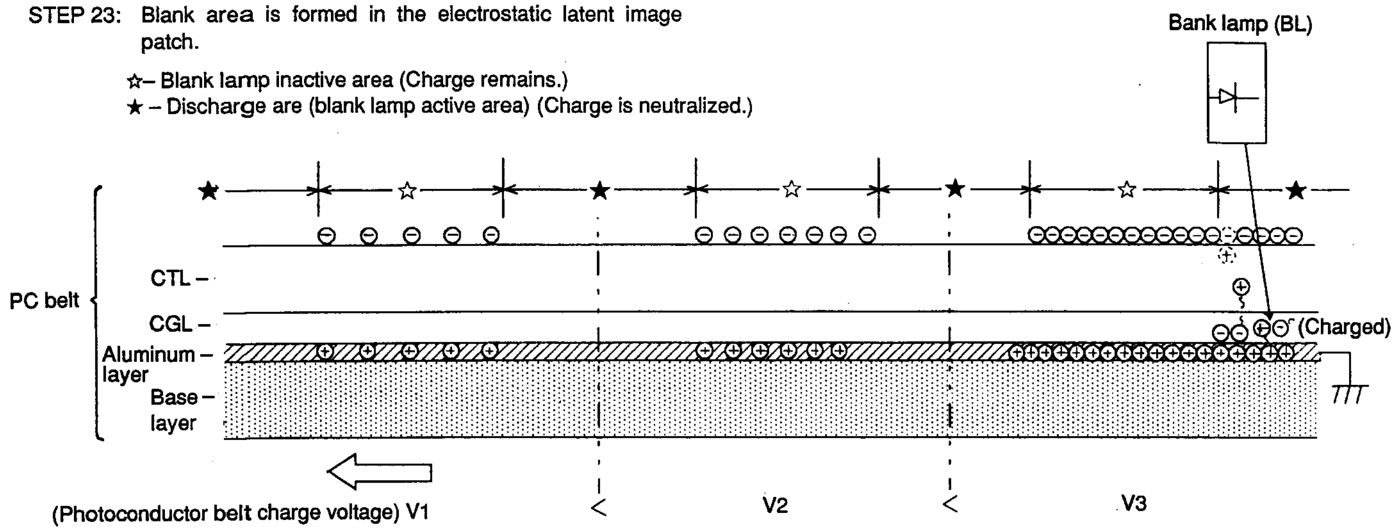
The MHVG grid voltage is changed so as to charge the PC belt at three levels.





STEP 23: Blank area is formed in the electrostatic latent image patch.

☆– Blank lamp inactive area (Charge remains.)
★ – Discharge are (blank lamp active area) (Charge is neutralized.)


Bank lamp (BL)
PC belt
CTL –
CGL –
Aluminum – layer
Base – layer
(Charged)
(Photoconductor belt charge voltage) V1
<
V2
<
V3

By turning on and off the blank lamps three times, individual charge areas with different voltage levels are created on the PC belt as explained in STEP 23.

STEP 24: Yellow development

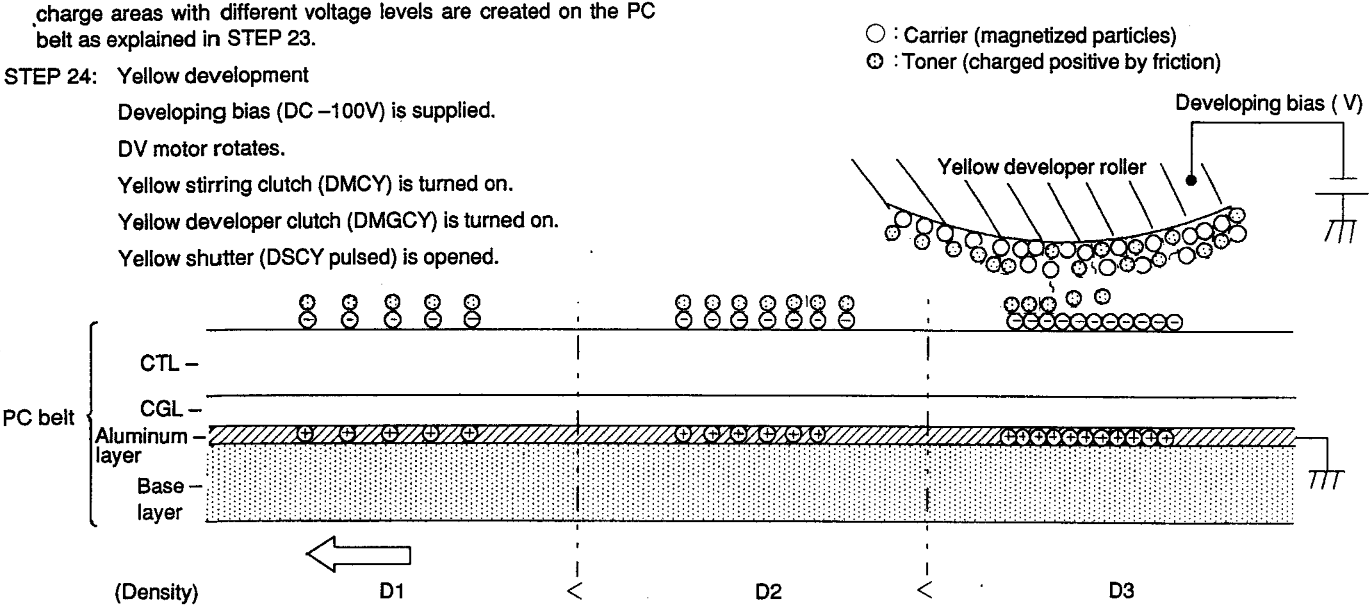
Developing bias (DC –100V) is supplied.

DV motor rotates.

Yellow stirring clutch (DMCY) is turned on.

Yellow developer clutch (DMGCY) is turned on.

Yellow shutter (DSCY pulsed) is opened.


○ : Carrier (magnetized particles)
⊕ : Toner (charged positive by friction)
Developing bias ( V)
Yellow developer roller
PC belt
CTL –
CGL –
Aluminum – layer
Base – layer
(Density)
D1
<
D2
<
D3

A visible image is produced by electrostaticly attaching toner to the latent image on the PC belt surface. Using dual-component magnetic brush technology, the toner is charged positive by the friction with the carrier so that the toner may be attracted to the negative charge area on the PC belt surface. The density of the image is proportion to the PC belt charge potential generated at STEP 23 and differs to each of the three areas.

STEP 25: The developer and toner on the yellow developer roller are cleaned.

Yellow shutter closed (DSCY pulsed).

Yellow developer clutch (DMGCY) is turned off.

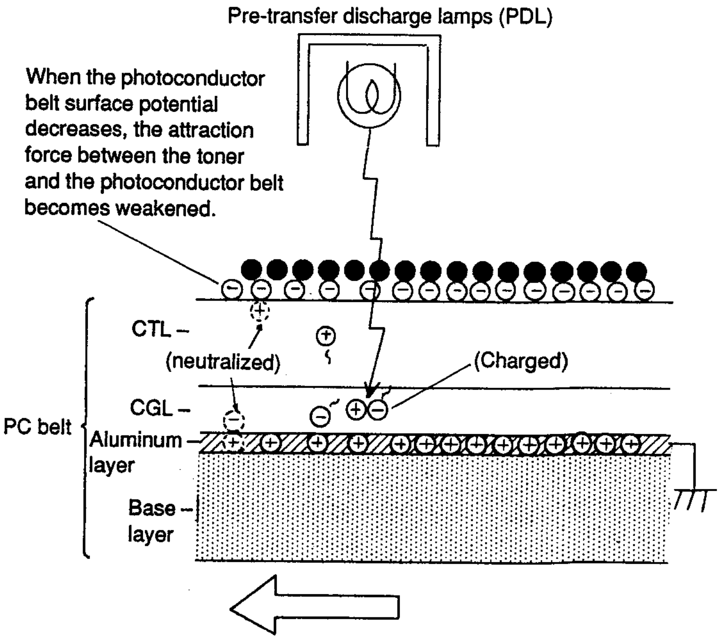
Yellow stirring clutch (DMCY OFF) is turned off.

(Similar as STEP 10.)

STEP 26: PC belt pre-transfer charge

The pre-transfer discharge lamps (PDL) are energized.

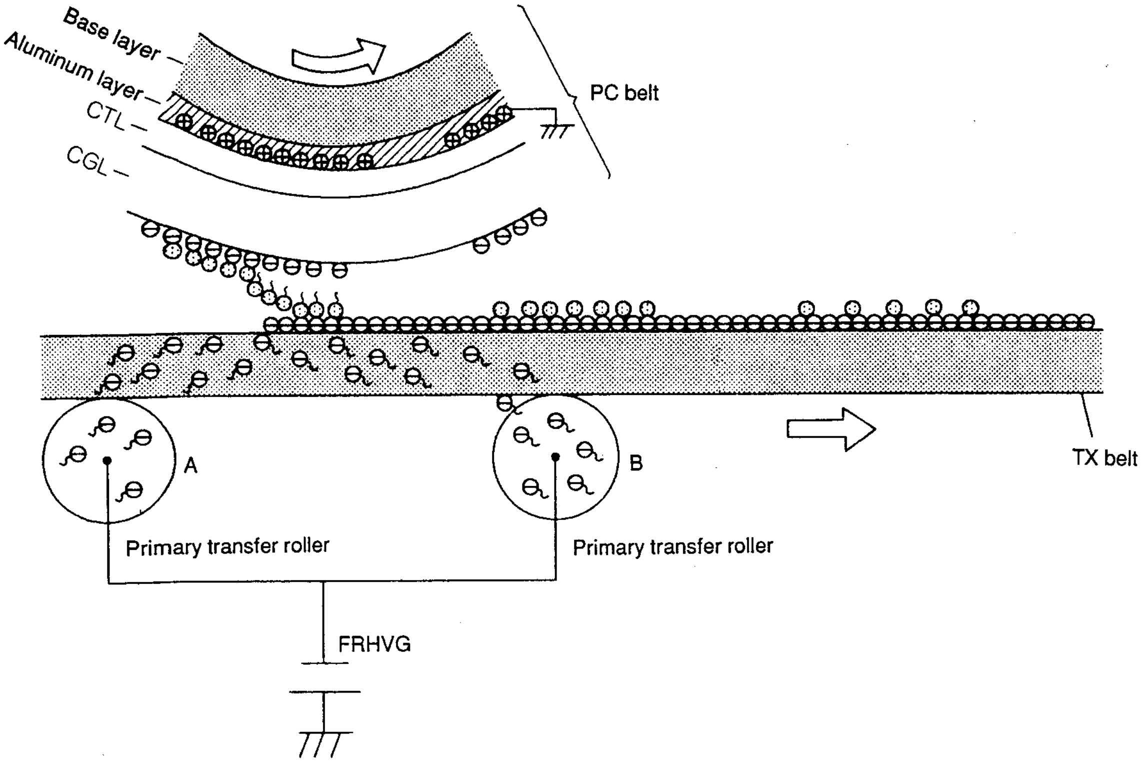
After the development is completed, the PC belt is exposed to the pre-transfer discharge lamps to reduce the attraction of the charged toner with the PC belt. This increases transfer efficiency of the toned image on the PC belt to the TX belt.


Pre-transfer discharge lamps (PDL)
When the photoconductor belt surface potential decreases, the attraction force between the toner and the photoconductor belt becomes weakened.
PC belt
CTL –
(neutralized)
(Charged)
CGL –
Aluminum – layer
Base – layer

STEP 27: Yellow toned image on the PC belt is transfered on the TX belt.

The primary transfer roller voltage (FRHVG) is supplied.

By charging the TX belt above the surface potential of the PC belt by applying a high negative DC voltage via the primary transfer roller, the attraction between the TX belt and toner is intensified. This attraction is greater than that holding the toner to the photo conductor belt, so it transfers to the TX belt.



(Reference)
Photo mode process

There are two photo mode processes:

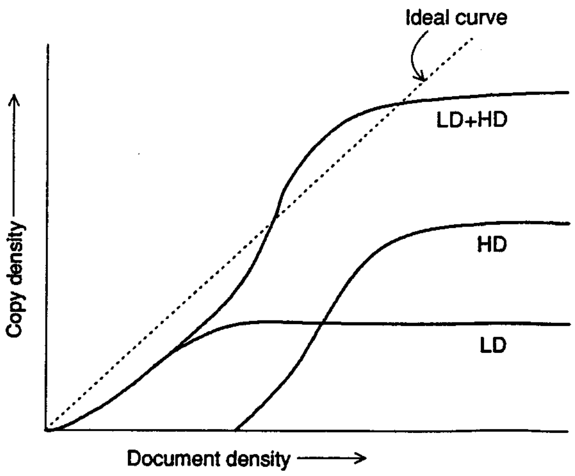
- Monochrome black-and-white photo mode (Screen photo mode)
- Full color photo mode (6 rotations process with HD/LD)

In the monochrome black-and-white photo mode, similarly to the CX-7500, a special screen is provided in the light path to improve gradation.

In the full color photo mode, images in the dark area (High Density (HD) area) of the document and images in the light area (Low Density (LD) area) are separately processed. The light area images are formed in the screen photo mode, and the dark area images are formed in the graphic mode.

The two images are then overlapped on the TX belt to form one copy image.

This full color photo mode (6 rotations process with HD/LD) provides a wider gradation than the conventional CX-7500 full color photo mode. Thus a wider gradation in LD area in the screen photo mode and clear reproduction of characters in HD area in the graphic mode are provided together.



STEP 28: PC belt cleaning
PBCS is ON.
The main cleaner blade makes close contact with the PC belt.

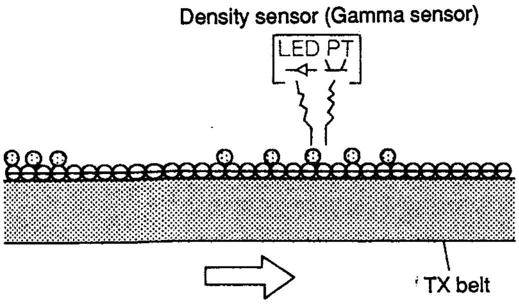
(The sub cleaner blade is always in close contact with the PC belt.)

(See STEP 3.)

STEP 29: Yellow gamma correction (Density of the yellow toner image on the TX belt is sensed by the density sensor.)

Density of the toned image areas, D1, D2, and D3, on the TX belt is sensed.

The main corona grid reference voltage for producing the yellow toner image is calculated from the relationship between the three main corona grid voltages in STEP 22 based on a comparison of the actual toner image density (image density (gamma) sensor output), and the reference density.



As stated in STEP 22, the main corona grid vltage, the toner image density (image density (gamma) sensor output), and the reference density (reference image density gamma) sensor output) relate to each other.
The reference main corona grid voltage for formation of the yellow toner image is calculated from the above relationship.

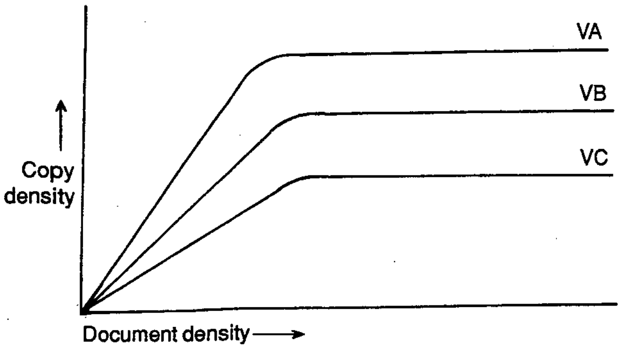
(Reference)
Gamma correction process

This process keeps the main corona grid voltage to the proper level to match the density of the original with the copy density.

To match densities, the PC belt surface potential is set to the appropriate voltage.

While varying the PC belt surface potential at certain steps, color toner patches are created on the TX belt individually for yellow, magenta, and cyan toners. By sensing these patches with the gamma sensor, the PC belt surface potential is calculated from the gamma sensor level when the reference patch density is detected.

The PC belt surface potential is then controlled individually for each color of yellow, magenta, and cyan.



| PC belt surface potential (MHVG grid voltage) | Document density vs. copy density |
|---|---|
| VA | If the photoconductor belt surface potential is high, dark copy density result or copy density saturation could result relative to the density of the original. (Poor linearity in the higher density area) |
| VB | If the photoconductor belt surface potential is appropriate, then the copy density relative to the document density is proper. |
| VC | For the photoconductor belt surface potential is low, weak copy density result or copy density saturation could result relative to the density of the original. |

STEP 30: TX belt cleaning.

The cleaner blade makes close contact with the TX belt.

TBCS is ON
(See STEP 4.)

STEP 31: Electrostatic latent image patch is formed for magenta toner.

PC belt charge

(See STEP 22.)

MHVG is turned on.

MHVG grid is turned on.

STEP 32: Blank area is formed between electrostatic latent image patches.

(See STEP 23.)

STEP 33: Magenta development

(See STEP 24.)

DV bias is ON. (DC –100V)

DV motor starts to run.

Magenta stirring clutch (DMCM) is is turned on.

Magenta developer clutch (DMGCM) is turned on.

Magenta shutter opens (DSCM pulsed).

STEP 34: The developer and toner on the magenta developer roller are cleaned.

(See STEP 10.)

Magenta shutter is closed (DSCM pulsed).

Magenta developer clutch (DMGCM) is turned off.

Magenta stirring clutch (DMCM) is turned off.

STEP 35: PC belt pre-transfer discharge

Pre-transfer discharge lamps (PDL) is turned on.

(See STEP 26.)

STEP 36: Magenta toned image on the PC belt is transfered onto the TX belt.

(See STEP 27.)

Primary transfer roller voltage (FRHVG) is turned on.

STEP 37: PC belt cleaning.

The main cleaner blade makes close contact with the PC belt.

PBCS is ON.

(The sub cleaner blade is always in close contact with the PC belt.)
(See STEP 3.)

STEP 38: Magenta gamma correction

(Magenta toner image density on TX belt is sensed by the gamma sensor.

(See STEP 29.)

STEP 39: TX belt cleaning

(See STEP 4.)

TBCS is turned on.

STEP 40: Electrostatic latent image patch is formed for cyan toner.

PC belt charged

(See STEP 22.)

MHVG is turned on.

MHVG grid is turned on.

STEP 41: Blank area is formed between the electrostatic latent image patches.

(See STEP 23.)

STEP 42: Cyan development

(See STEP 24.)

DV bias is ON. (DC –100V)

DV motor starts to run.

Cyan stirring clutch (DMCC) is turned on.

Cyan developer clutch (DMGCC) is turned on.

Cyan shutter opens (DSS pulsed).

STEP 43: The developer and toner on the cyan developer roller are cleaned.

(See STEP 10.)

Cyan shutter (DSCC pulsed) closes.

Cyan developer clutch (DMGCC) is turned off.

Cyan stirring clutch (DMCC) is turned off.

STEP 44: PC belt pre-transfer discharge

Pre-transfer discharge lamps (PDL) is turned off.

(See STEP 26.)

STEP 45: Cyan toned image on the PC belt is transfered on the TX belt.

(See STEP 27.)

The primary transfer roller voltage (FRHVG) is supplied.

STEP 46: PC belt cleaning.

PBCS is ON.

The main cleaner blade makes close contact with the PC belt.

(The sub cleaner blade is always in close contact with the PC belt.)

(See STEP 3.)

STEP 47: Cyan gamma correction

Cyan toner image density on the TX belt is sensed by the gamma senser.

(See STEP 29.)

STEP 48: TX belt cleaning

(See STEP 4.)

TBCS is turned on.

STEP 49: Gamma correction finish /READY to copy

READY lamp is turned on.

STEP 50: Color PSW ON (Full color copy mode process begins.)

STEP 51: PC belt and TX belt motor start to run.

PC belt and TX belt rotate.

**STEP 52:** PC belt discharge

(See STEP 5.)

Blank lamps, discharge lamps, and pre-transfer discharge lamps are turned on.

**STEP 53:** PC belt charge for yellow toner

(See STEP 6.)

MHVG is turned on.

MHVG grid is turned on. to add the voltage calculated in STEP 29.

**STEP 54:** Blank lamps are turned off.

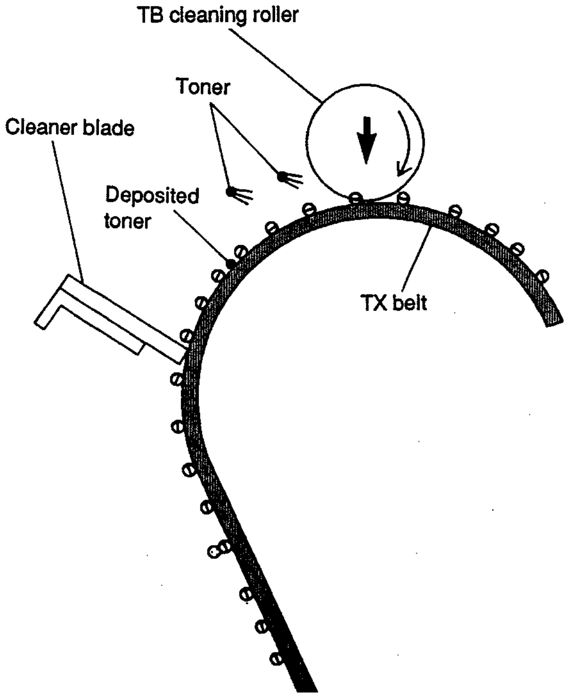
TX belt grinding

The DV motor rotates.

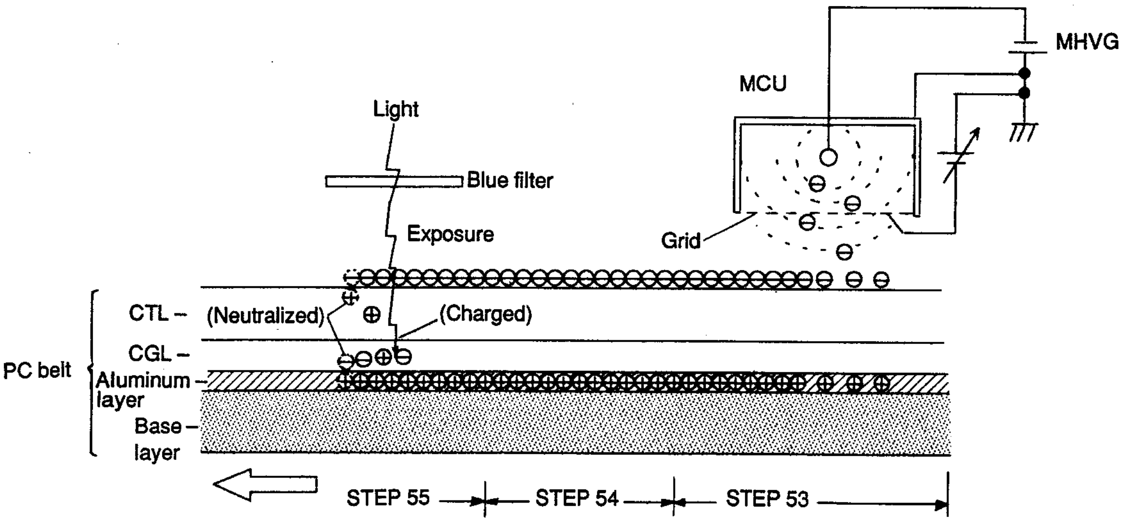
The TB cleaning roller rotates and makes close contact with the TX belt.

CRS is turned on.

The toner deposited on the TX belt, which has not been removed by the cleaner blade, is removed by the TB cleaning roller.



This operation must be performed after every 10 copies for the full color multicopy mode, and after every 22 copies for the other multicopy modes. For the single copy mode, however, it must be performed after every 10 copies.



**STEP 55:** Blue light exposure (color separation)

Blue filter is set.

Two copy lamps are turned on.

Light is exposed over the original by the copy lamps to project the image on the original via the mirror lens and RGB filters.

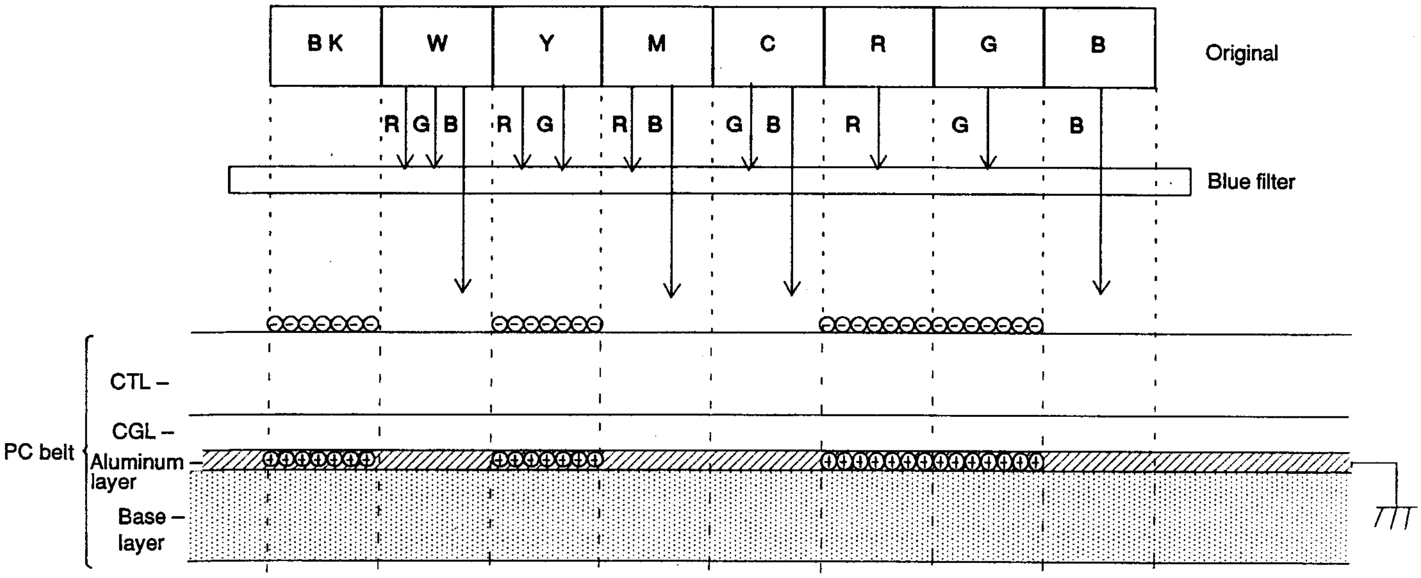
Where light reflects more intensely from the light area of the original, the PC belt is exposed by high illumination. Where image is dark, less illumination is given to the PC belt as the light is reflected less from the original surface.

Positive and negative charges are produced on the area of CGL which are exposed to light. The negative charge created in CGL moves towards the positive charge within the aluminum layer and the positive charge towards the negative charge in the PC belt surface. So, within the aluminum layer and the PC belt surface, the positive charges and negative charges neutralize each other so that the PC belt surface potential drops. The rate of CGL charge is proportionate to the contrast of the original (reflected light which illuminates the PC belt). More CGL charge is generated within the area of light image density which acts to abate more PC belt surface negative charge. A relatively large drops occurs in the PC belt surface potential. On the contrary, less charge is generated within the area of dark image which acts to abate less PC belt surface negative charge. A relatively small drops occurs in the PC belt surface potential. As a result, low density areas retain less surface potential and density areas retain more surface potential.

Since the blue filter transmits only the blue component, the negative charge in the PC belt areas which are black, yellow, red, or green are not discharged since these areas are not exposed by light. (Potential not neturalized.)

The blue, cyan, magenta, and white areas where a blue component exists are exposed on the PC belt so that the negative charge in the PC belt is discharged. (Potential neutralized.)

With the above operation, a latent image is formed on the PC belt


BK
W
Y
M
C
R
G
B
Original
R G B
R G
R B
G B
R
G
B
Blue filter
CTL –
CGL –
PC belt
Aluminum layer
Base layer

representing all areas that do not contain blue.

STEP 56: Yellow development

Developer bias is turned on.

DV motor starts to run.

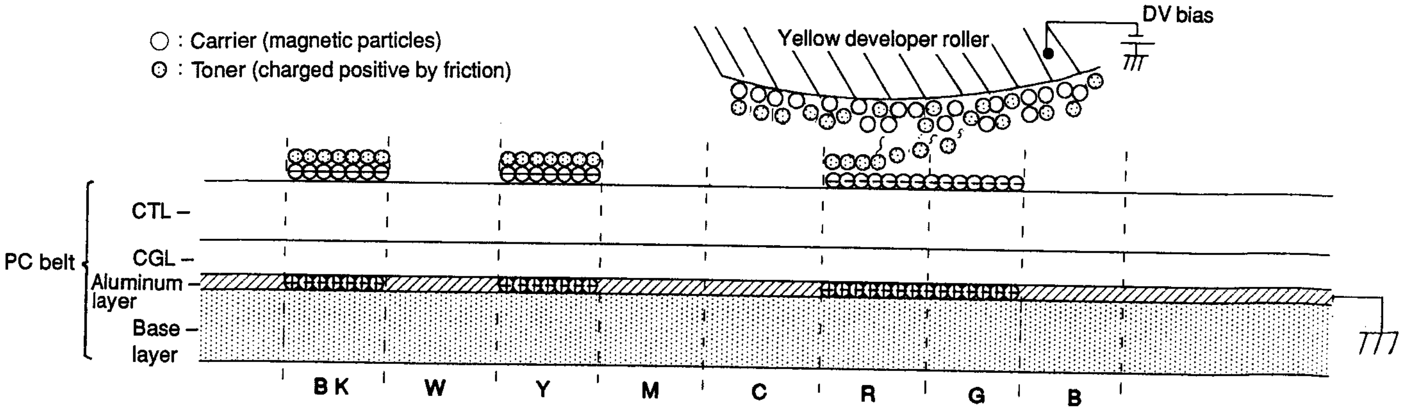
Yellow stirring clutch (DMCY) is turned on.

Yellow developer clutch (DMGCY) is turned on.

Yellow shutter (DSCY pulsed) is turned on.

The latent image created in STEP 55 is developed with the yellow toner. The latent image on the PC belt surface attracts the yellow toner to make it a visual image. The yellow toner that absorbs blue is attached over the black, yellow, red, and green area where no blue component exists.

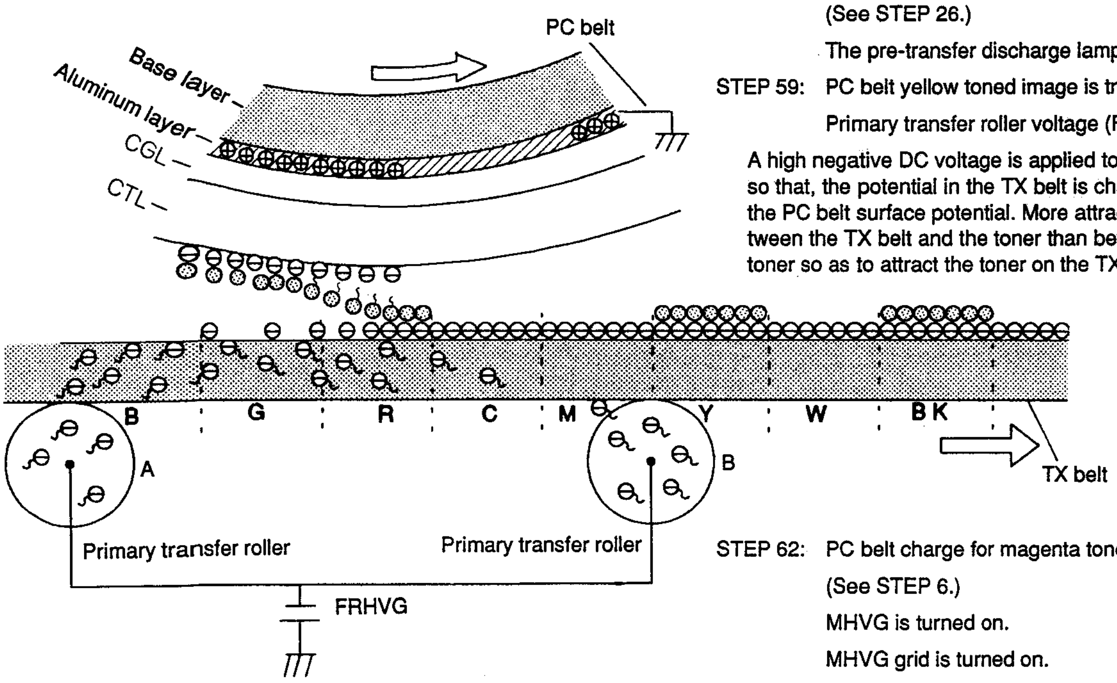
The toner is charged positive by the friction with the carrier in the dual-component magnetic brush development method, therefore the toner is attracted to the negative charge on the PC belt.


○ : Carrier (magnetic particles)
⊙ : Toner (charged positive by friction)
Yellow developer roller
DV bias
CTL –
CGL –
PC belt
Aluminum layer
Base layer
BK
W
Y
M
C
R
G
B

Where high surface potential (more negative charge) exists on the PC belt due to a densely toned area of the original relative to STEP 55, more toner is attracted. Low surface potential area (less negative charged) has less toner attracted.

STEP 57: The developer and toner on the yellow developer roller are cleaned.

(See STEP 10.)


PC belt
Base layer
Aluminum layer
CGL
CTL
B
G
R
C
M
Y
W
BK
A
B
TX belt
Primary transfer roller
Primary transfer roller
FRHVG

STEP 60: PC belt cleaning

PBCS is ON.

The main cleaner blade makes close contact with the PC belt.

(The sub cleaner blade is always in close contact with the PC belt.)

(See STEP 3.)

STEP 61: PC belt discharge

(See STEP 5.)

Blank lamps, discharge lamps, and pre-transfer discharge lamps are turned on.

Yellow developer shutter (DSCY pulsed) closes.

Yellow developer clutch (DMGCY) is turned off.

Yellow stirring clutch (DMCY) is turned off.

STEP 58: PC belt yellow image area discharge

(See STEP 26.)

The pre-transfer discharge lamps are turned on.

STEP 59: PC belt yellow toned image is transfered to TX belt.

Primary transfer roller voltage (FRHVG) is turned on.

A high negative DC voltage is applied to the primary transfer roller so that, the potential in the TX belt is charged more intensely than the PC belt surface potential. More attraction strength appears between the TX belt and the toner than between the PC belt and the toner so as to attract the toner on the TX belt.

STEP 62: PC belt charge for magenta toner

(See STEP 6.)

MHVG is turned on.

MHVG grid is turned on.

STEP 63: Blank lamps are turned off.

STEP 64: Green light exposure (color separation)

(See STEP 55.)

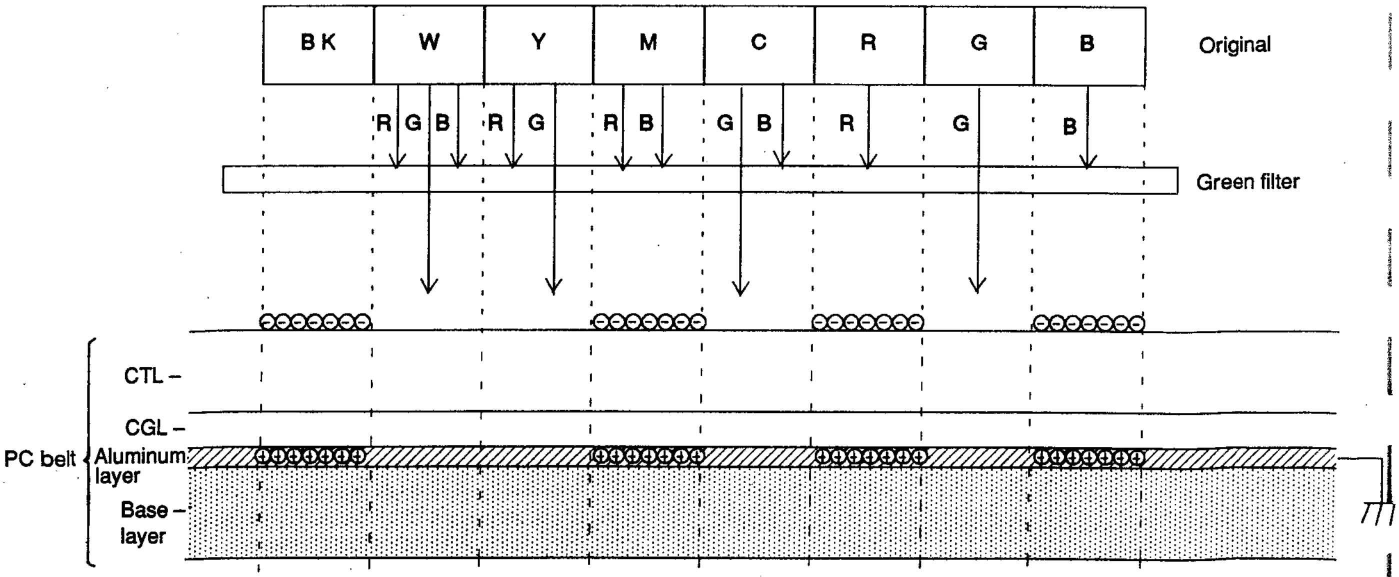
Green filter set

Copy lamp is turned on.

Since the green filter transmits only the green component of light, the PC belt is not exposed in areas containing black, magenta, red, and blue since no green component exists. Therefore, the negative charge in the PC belt is not discharged. (Potential does not abate.)

The image area of the original where a green component exists is exposed on the PC belt and discharge of the negative potential (Potential abates) takes place.

With the above operation, the latent image is formed on the PC belt, representing all areas that do not contain green.


BK
W
Y
M
C
R
G
B
Original
R G B
R G
R B
G B
R
G
B
Green filter
CTL
CGL
PC belt
Aluminum layer
Base layer

STEP 65: Magenta development

Developer bias is turned on.

DV motor starts to run.

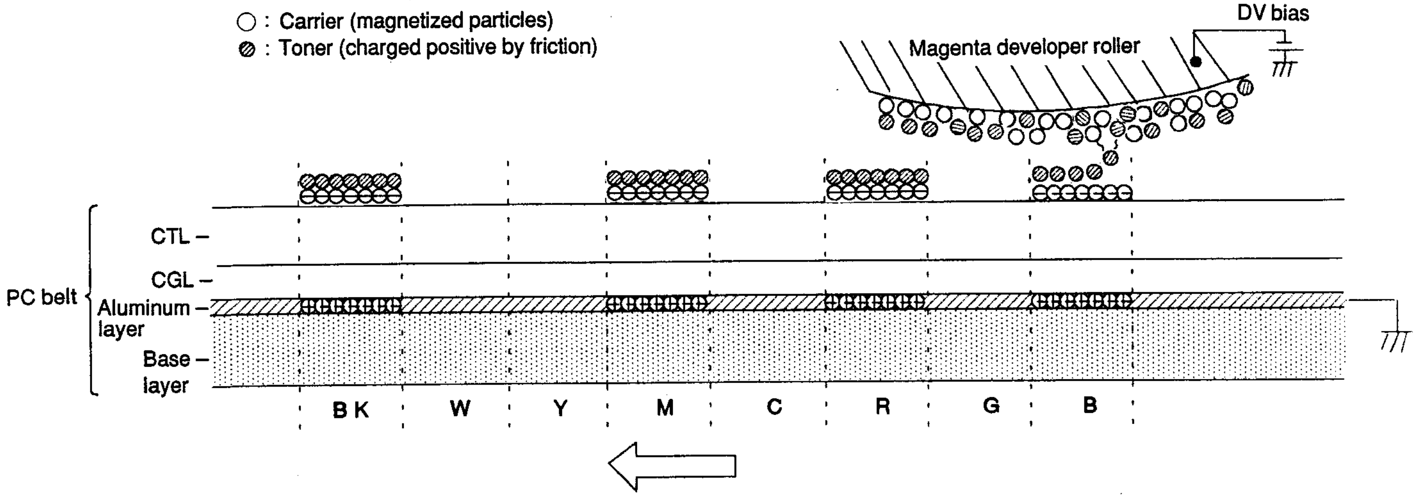
Magenta stirring clutch (DMCM) is turned on.

Magenta developer roller clutch (DMGCM) is turned on.

Magenta shutter (DSCM pulsed) is opened.

The latent image created in STEP 64 is developed with the magenta toner. The latent image on the PC belt surface attracts the magenta toner to make it a visual image. The magenta toner that absorbs green is attached over the black, magenta, red and blue area where no green component exists.

(See STEP 56.)


○ : Carrier (magnetized particles)
⊘ : Toner (charged positive by friction)
DV bias
Magenta developer roller
PC belt
CTL
CGL
Aluminum layer
Base layer
BK
W
Y
M
C
R
G
B

STEP 66: The developer and toner on the magenta developer roller are cleaned.

(See STEP 10.)

Magenta shutter (DSCM pulsed) closes.

Magenta developer clutch (DMGCM) is turned off.

Magenta stirring clutch (DMCM) is turned off.

STEP 67: PC belt magenta image area discharge

(See STEP 26.)

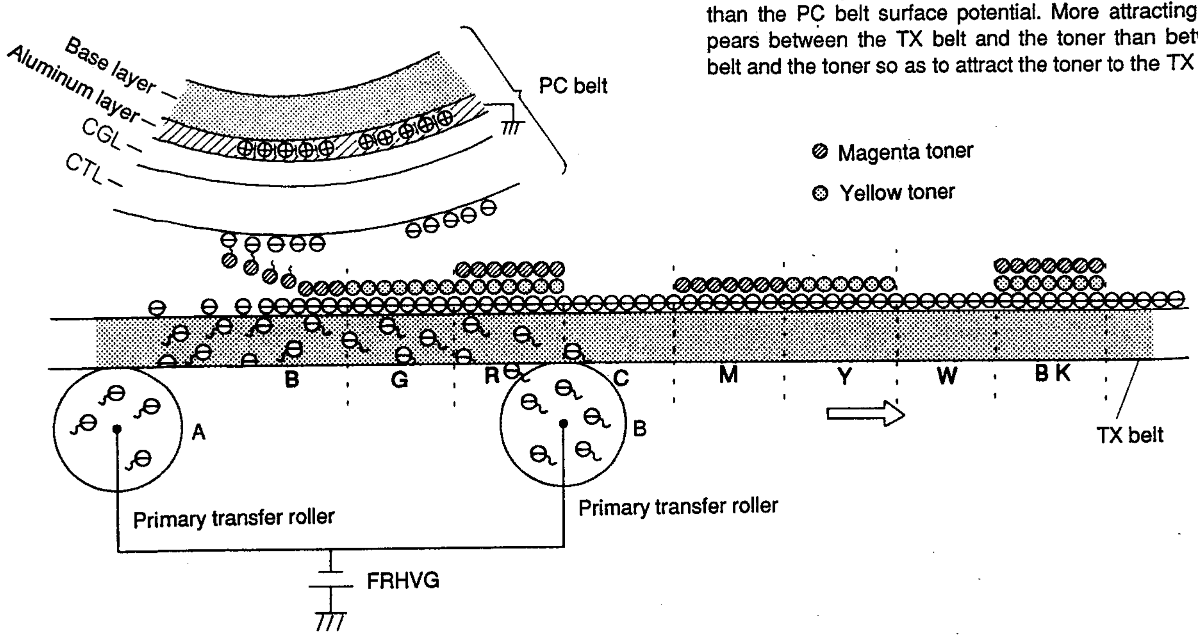
The pre-transfer discharge lamps are turned on.

STEP 68: PC belt magenta toned image is transfered to TX belt.

(Aligned with the image transfered area in STEP 59 and overlaid.)

The primary transfer roller voltage (FRHVG) is turned on.

When a high negative DC voltage is applied to the primary transfer roller, the potential in the TX belt is charged more intensely than the PC belt surface potential. More attracting strength appears between the TX belt and the toner than between the PC belt and the toner so as to attract the toner to the TX belt.


Base layer
Aluminum layer
CGL
CTL
PC belt
⊘ Magenta toner
⊗ Yellow toner
B
G
R
C
M
Y
W
BK
A
B
TX belt
Primary transfer roller
Primary transfer roller
FRHVG

STEP 69: PC belt cleaning

(See STEP 3.)

PC belt cleaner blade solenoid (PBCS) is turned on.

The main cleaner blade moves close contact with the PC belt.

STEP 70: PC belt discharge

(See STEP 5.)

Blank lamps, discharge lamps, and pre-transfer discharge lamps are turned on.

STEP 71: PC belt charge

(See STEP 6.)

MHVG is turned on.

MHVG grid is turned on.

STEP 72: Blank lamps are turned off.

STEP 73: Red light exposure (color separation)

Red filter is set.

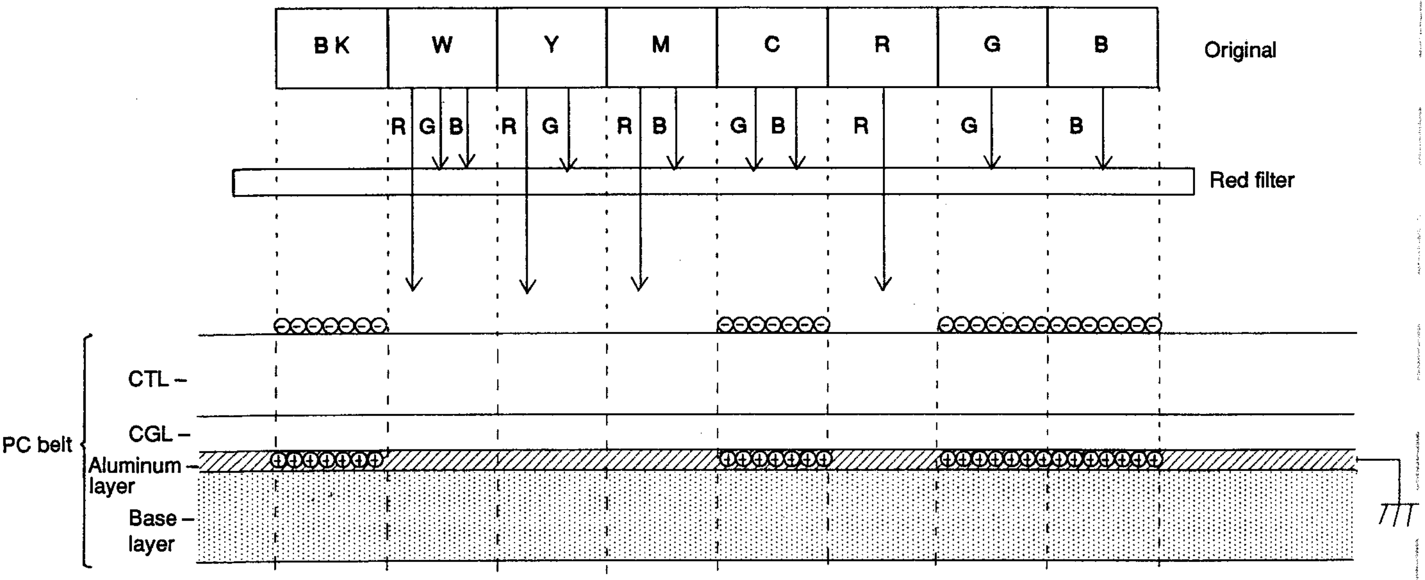
Copy lamp is turned on.

Since the red filter transmits only the red component of light, the PC belt is not exposed in arear containing black, cyan, green, and blue because no red component exists. Therefore, the negative charge in the PC belt is not discharged. (Potential is not neutralized.)

The image area of the original where a red component exists is exposed on the PC belt and discharge of the negative potential takes place. (Potential is neutralized.)

With the above operation, the latent image is formed on the PC belt, representing all areas that do not contain red.

(See STEP 55.)


BK
W
Y
M
C
R
G
B
Original
R G B
R G
R B
G B
R
G
B
Red filter
PC belt
CTL -
CGL -
Aluminum - layer
Base - layer

STEP 74: Cyan development

Developer bias is turned on.

DV motor starts to run.

Cyan stirring clutch (DMCC) is turned on.

Cyan developer clutch (DMGCC) is turned on.

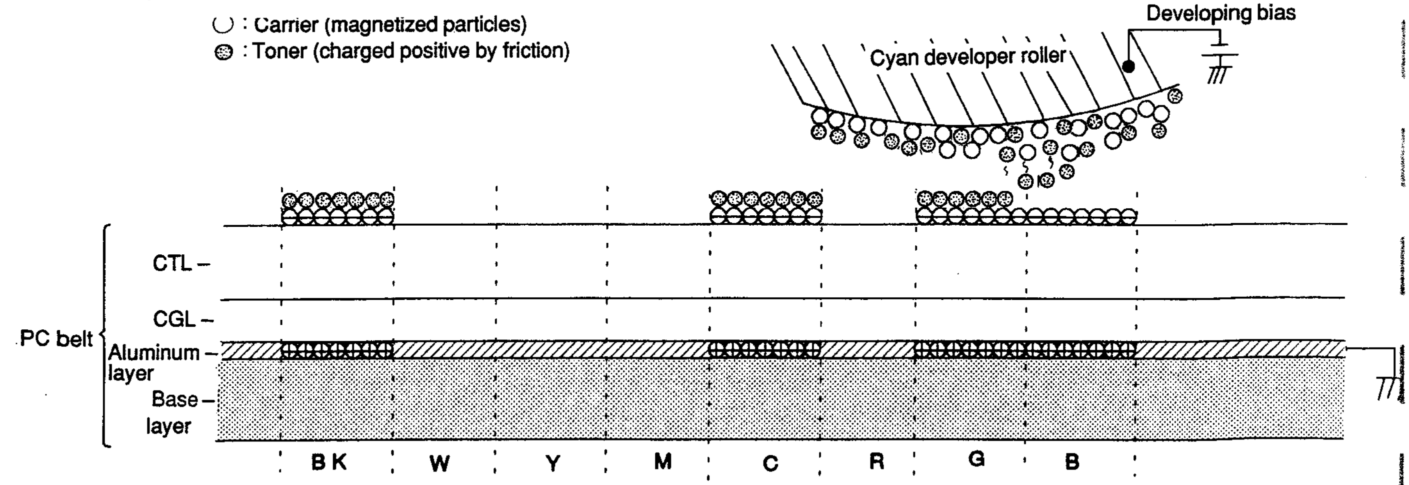
Cyan shutter (DSCC pulsed) opens.

○ : Carrier (magnetized particles)

◍ : Toner (charged positive by friction)

The latent image created in STEP 73 is developed with the cyan toner. The latent image on the PC belt surface attracts the cyan toner to make it a visual image. The cyan toner that absorbs red is attached over the black, cyan, green, and blue area where no red component exists.

(See STEP 56.)


Developing bias
Cyan developer roller
PC belt
CTL -
CGL -
Aluminum - layer
Base - layer
BK
W
Y
M
C
R
G
B

STEP 75: The developer and toner on the cyan developer roller are cleaned.

(See STEP 10.)

Cyan shutter (DSCC pulsed) closes.

Cyan developer roller clutch (DMGCC) is turned off.

Cyan stirring clutch (DMCC) is turned off.

STEP 76: PC belt discharge

(See STEP 26.)

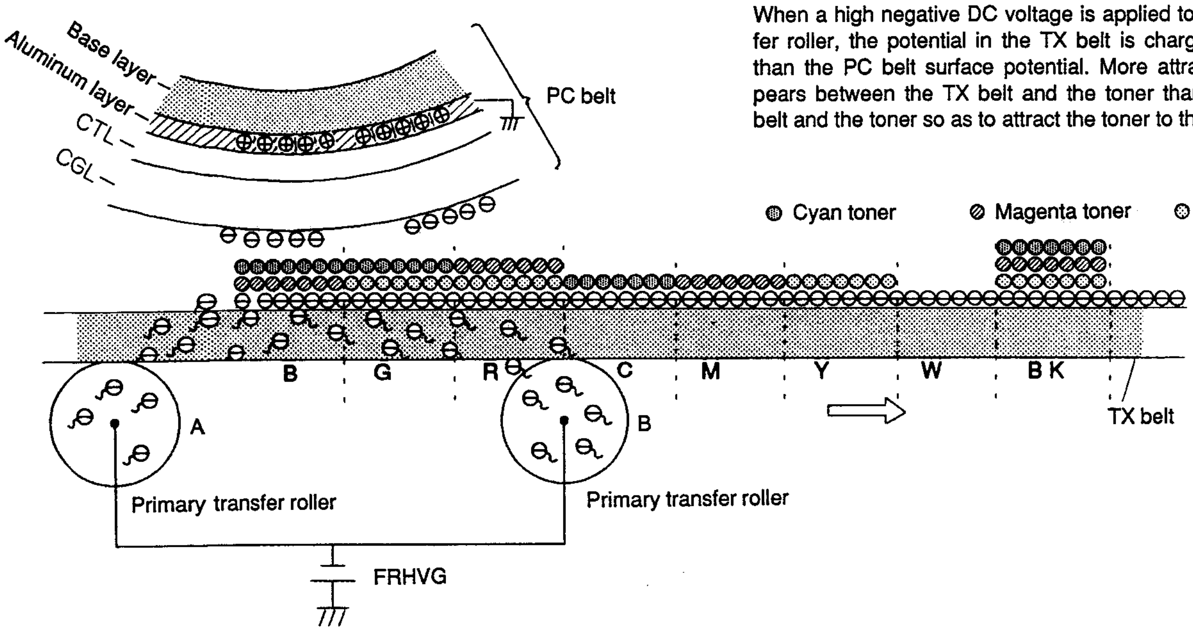
The pre-transfer discharge lamps are turned on.

STEP 77: PC belt cyan toned image is transfered to TX belt.

Primary transfer roller voltage (FRHVG) is turned on.

(Aligned with the image area transfered in STEP 65 and overlaid.)

When a high negative DC voltage is applied to the primary transfer roller, the potential in the TX belt is charged more intensely than the PC belt surface potential. More attraction strength appears between the TX belt and the toner than between the PC belt and the toner so as to attract the toner to the TX belt.


Base layer
Aluminum layer
CTL
CGL
PC belt
Cyan toner
Magenta toner
Yellow toner
B
G
R
C
M
Y
W
BK
A
B
TX belt
Primary transfer roller
Primary transfer roller
FRHVG

STEP 78: Paper feed

Paper is transported to the transfer block.

RRC is ON.

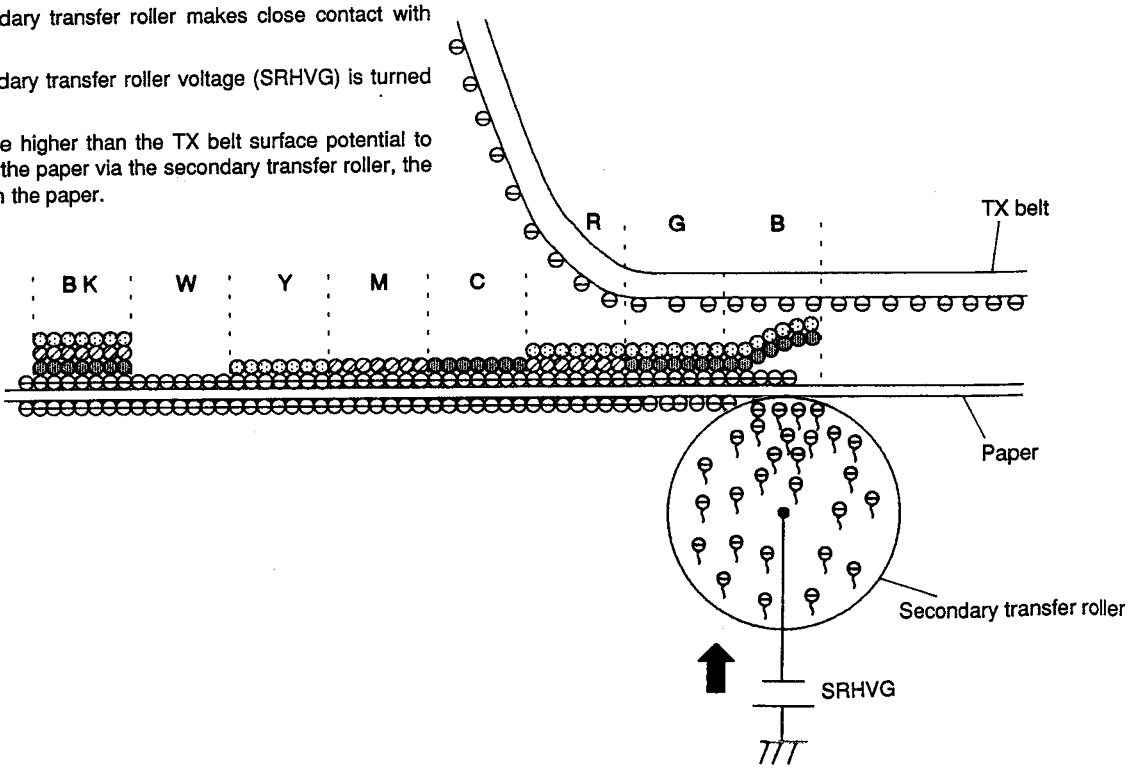
STEP 79: All of the layers of toner on the TX belt are transfered to the copy paper simultaneously.

TRCS is ON.

The secondary transfer roller makes close contact with paper.

The secondary transfer roller voltage (SRHVG) is turned on.

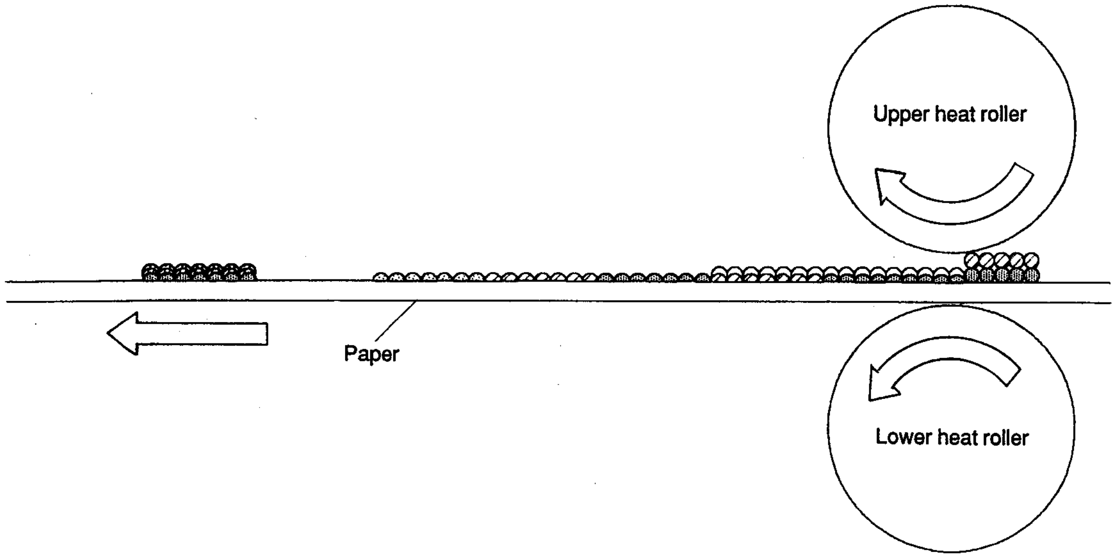
By adding a voltage higher than the TX belt surface potential to the reverse side of the paper via the secondary transfer roller, the toner is attracted on the paper.

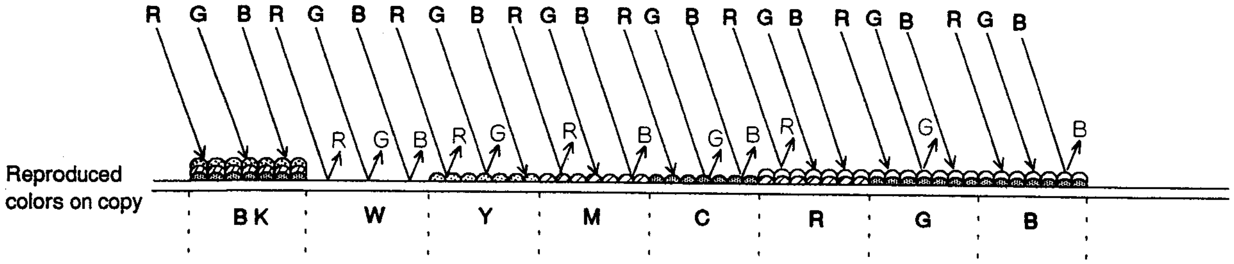

R
G
B
TX belt
BK
W
Y
M
C
Paper
Secondary transfer roller
SRHVG

STEP 80: Separation
(Natural separation)

STEP 81: Fusing

Toned image on the paper is fused by means of heat and pressure of the heat roller. Fuser oil is applied to the upper heat roller.


Upper heat roller
Paper
Lower heat roller


R G B R G B R G B R G B R G B R G B R G B R G B
R G B R G R B G B R G B
Reproduced colors on copy
BK
W
Y
M
C
R
G
B

⊛ Yellow toner

⊘ Magenta toner

● Cyan toner

STEP 82: PC belt cleaning
(See STEP 3.)
PC belt cleaner blade solenoid (PBCS) is turned on.

STEP 83: TX belt cleaning
TX belt cleaner blade solenoid (TBCS) is turned on.
(See STEP 4.)

Complete full color copy process

## 7. Copy mode/process speed

| Copy mode | Paper kind | Fusing speed | Paper transfer speed |
|---|---|---|---|
| Full color | Plain paper (*1) | 115mm/Sec | 184mm/Sec |
| | Plain paper (2) | 115mm/Sec | 115mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Monochrome (R. G. B.) | Plain paper (*1) | 115mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 115mm/Sec | 115mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Monochrome (Y. M. C.) | Plain paper (*1) | 184mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 184mm/Sec | 184mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Black-and-white | Plain paper (*1) | 184mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 184mm/Sec | 184mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |

*1: The length in transport direction is 216mm or less.

*2: the length in transport direction is 216mm or above.

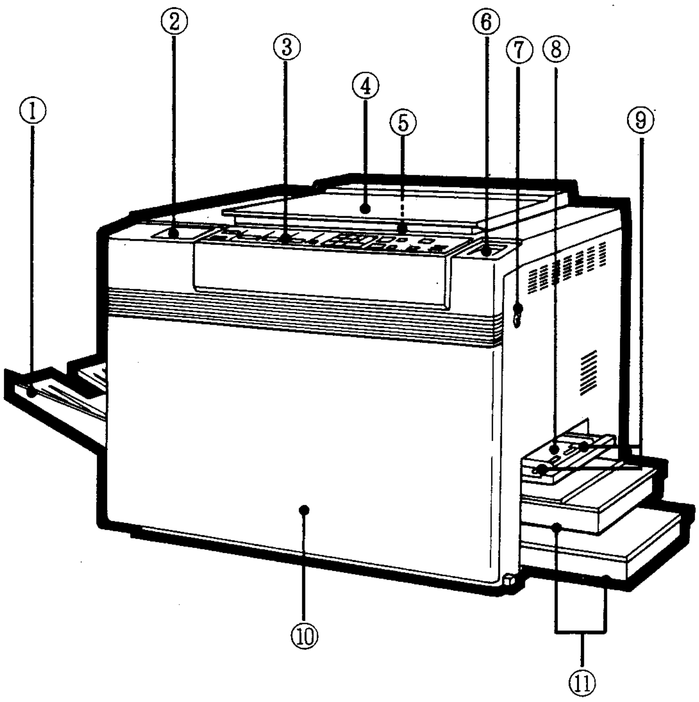
## 8. Operation mode/voltage

| Item | Copy mode / Operation mode | | | Full color | | Monochrome | | | | Black-white | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Y, M, C | | R, G, G | | | |
| | | | | GR | PH | GR | PH | GR | PH | GR | PH |
| Primary transfer roller voltage | First layer transfer | | | DC–500V | DC–500V | DC –500V | | DC –500V | | DC –900V | |
| | Second layer transfer | | | –500V | –500V | — | | –500V | | — | |
| | Third layer transrer | | | –900V | –600V | — | | — | | — | |
| | Fourth layer transfer | | | — | –600V | — | | — | | — | |
| | Fifth layer transfer | | | — | –700V | — | | — | | — | |
| | Sixth layer transfer | | | — | –900V | — | | — | | — | |
| | No transfer, racing (with toner) | | | –600V | * | –600V | | –600V | | –600V | |
| Secondary transfer roller voltage | Transfer speed | Toner | Transfer paper | | | | | | | | |
| | 184 mm/s | 2 kinds | Normal paper (216mm or less in the transport direction | DC –1.6KV | | DC –1.4KV | | | | DC –1.4KV | |
| | 184 mm/s | 1 kind | Normal paper | DC –1.4KV | | DC –1.4KV | | | | DC –1.4KV | |
| | 115 mm/s | 2 kinds or more | Normal paper (216mm or more in the transport direction) | | | | | | | | |
| | 60 mm/s | No relation | OHP film | DC –2.0KV | | DC –2.0KV | | | | DC –2.0KV | |
| DV bias voltage | When developing | | | DC –100V | DC –80V | DC –100V | | DC –80KV | | DC –100V | DC –80V |
| | When warning up | | | DC –60V | | DC –60V | | | | DC –60V | |

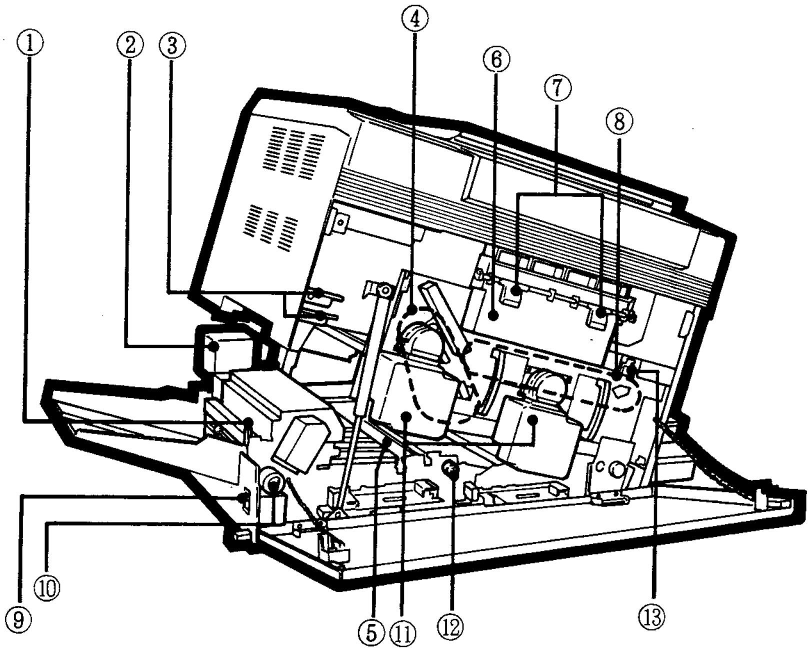
* When full color photo mode, the first ~ fifth layer racing without transfer: DC–500V
The sixth layer racing without transfer: DC–600V

# [6] EXTERNAL AND INTERNAL STRUCTURES

## 1. External view



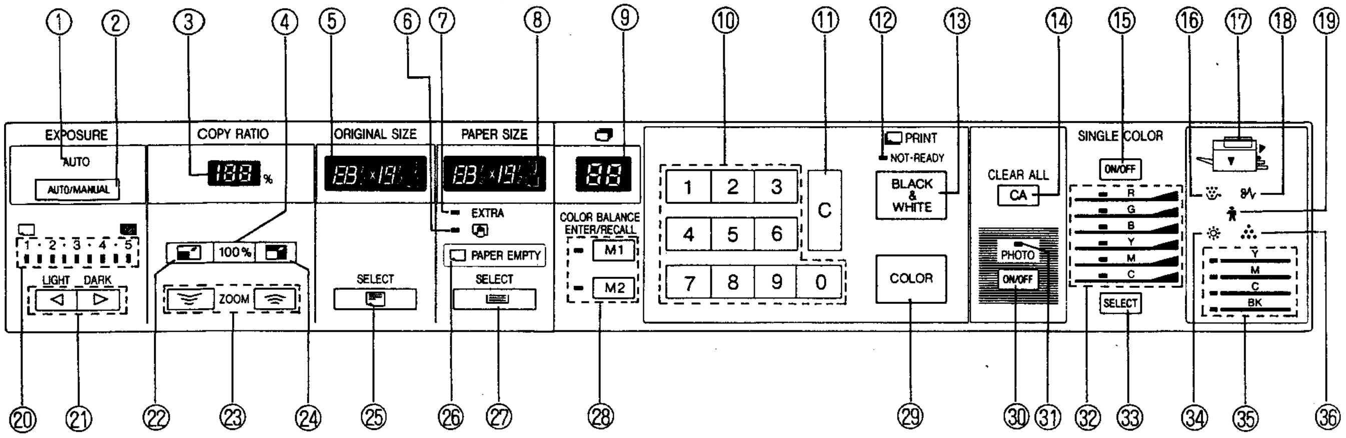
| | | | | | |
|---|---|---|---|---|---|
| ① | Exit tray | ② | Color balance adjustment sub panel | ③ | Operation panel |
| ④ | Document cover | ⑤ | Document glass | ⑥ | Paper clip tray |
| ⑦ | Key switch | ⑧ | Manual paper feed tray | ⑨ | Manual paper feed guide |
| ⑩ | Front exterior | ⑪ | Paper cassettes | | |



| | | | | | |
|---|---|---|---|---|---|
| ① | Paper-out section open/close lever | ② | Fuser oil bottle | ③ | Clamshell open/close lever |
| ④ | TX belt | ⑤ | Secondary TX roller | ⑥ | Developer unit |
| ⑦ | Developer unit open/close lever | ⑧ | PÇ belt | ⑨ | Power switch |
| ⑩ | Fuser roller rotating knob | ⑪ | Waste toner collection bottle | ⑫ | Transport roller rotating knob |
| ⑬ | Main corona | | | | |

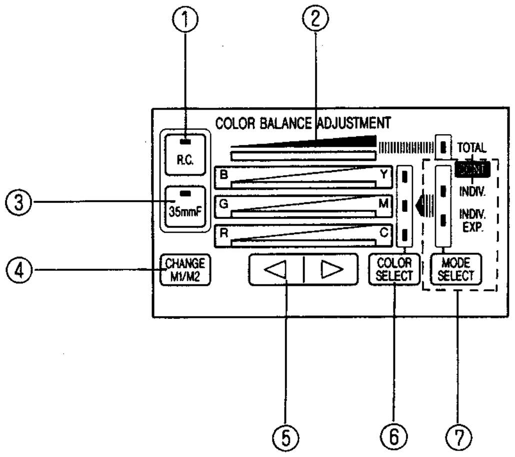
## 2. Internal structures

### A. Operation panel


EXPOSURE
AUTO
AUTO/MANUAL
1 2 3 4 5
LIGHT DARK
COPY RATIO
188 %
100%
ZOOM
ORIGINAL SIZE
SELECT
PAPER SIZE
EXTRA
PAPER EMPTY
SELECT
COLOR BALANCE ENTER/RECALL
M1
M2
1 2 3
4 5 6
7 8 9 0
C
PRINT
NOT-READY
BLACK & WHITE
COLOR
CLEAR ALL
CA
PHOTO
ON/OFF
SINGLE COLOR
ON/OFF
R G B Y M C
SELECT
Y M C BK
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲
⑳ ㉑ ㉒ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ ㉙ ㉚ ㉛ ㉜ ㉝ ㉞ ㉟ ㊱

| | | | | | |
|---|---|---|---|---|---|
| ① | AUTO exposure indicator | ② | AUTO/MANUAL selector | ③ | COPY RATIO indicator |
| ④ | Full-size key | ⑤ | ORIGINAL SIZE indicator | ⑥ | Manual feed indicator |
| ⑦ | EXTRA display lamp | ⑧ | PAPER SIZE indicator | ⑨ | Copy quantity indicator |
| ⑩ | 10-key pad | ⑪ | Clear key | ⑫ | NOT-READY indicator |
| ⑬ | BLACK & WHITE PRINT key | ⑭ | CLEAR ALL key | ⑮ | MONOCHROME ON/OFF key |
| ⑯ | Toner collecting bottle full indicator | ⑰ | Misfeed location indicator | ⑱ | Paper misfeed indicator |
| ⑲ | Maintenance lamp | ⑳ | Manual exposure indicator | ㉑ | Manual density adjustment keys |
| ㉒ | Reduction key | ㉓ | Zoom keys | ㉔ | Enlargement key |
| ㉕ | ORIGINAL SIZE SELECT key | ㉖ | PAPER EMPTY indicator | ㉗ | PAPER SIZE SELECT key |
| ㉘ | Preset copy RECALL/REGISTER indicator | ㉙ | COLOR PRINT key | ㉚ | PHOTO ON/OFF switch |
| ㉛ | PHOTO ON/OFF indicator | ㉜ | MONOCHROME indicator lamp | ㉝ | MONOCHROME SELECT key |
| ㉞ | Developer replacement indicator | ㉟ | Toner empty/Developer replacement indicators | ㊱ | Toner empty indicator |

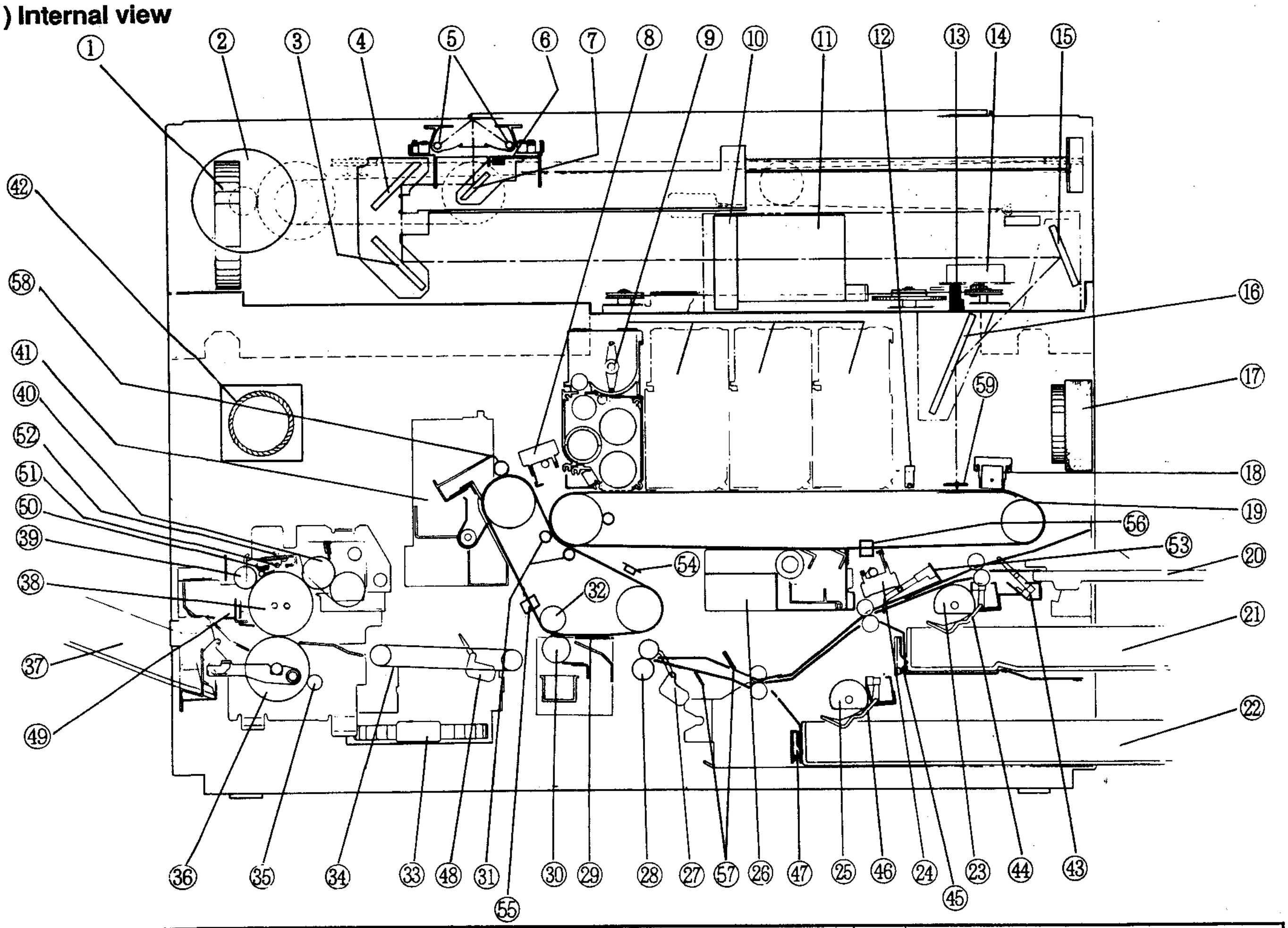
### B. (Color balance adjustment sub panel)


COLOR BALANCE ADJUSTMENT
R.C.
35mmF
CHANGE M1/M2
B Y
G M
R C
TOTAL
POINT
INDIV.
INDIV. EXP.
COLOR SELECT
MODE SELECT
① ② ③ ④ ⑤ ⑥ ⑦

| | | | | | |
|---|---|---|---|---|---|
| ① | Counter recall key/indicator | ② | Color adjustment indicator | ③ | Slide film copy mode key/indicator |
| ④ | Preset copy register mode key | ⑤ | Color adjustment keys | ⑥ | Color selector/indicator |
| ⑦ | Adjustment mode selector/indicator | | | | |

## 3. Internal view

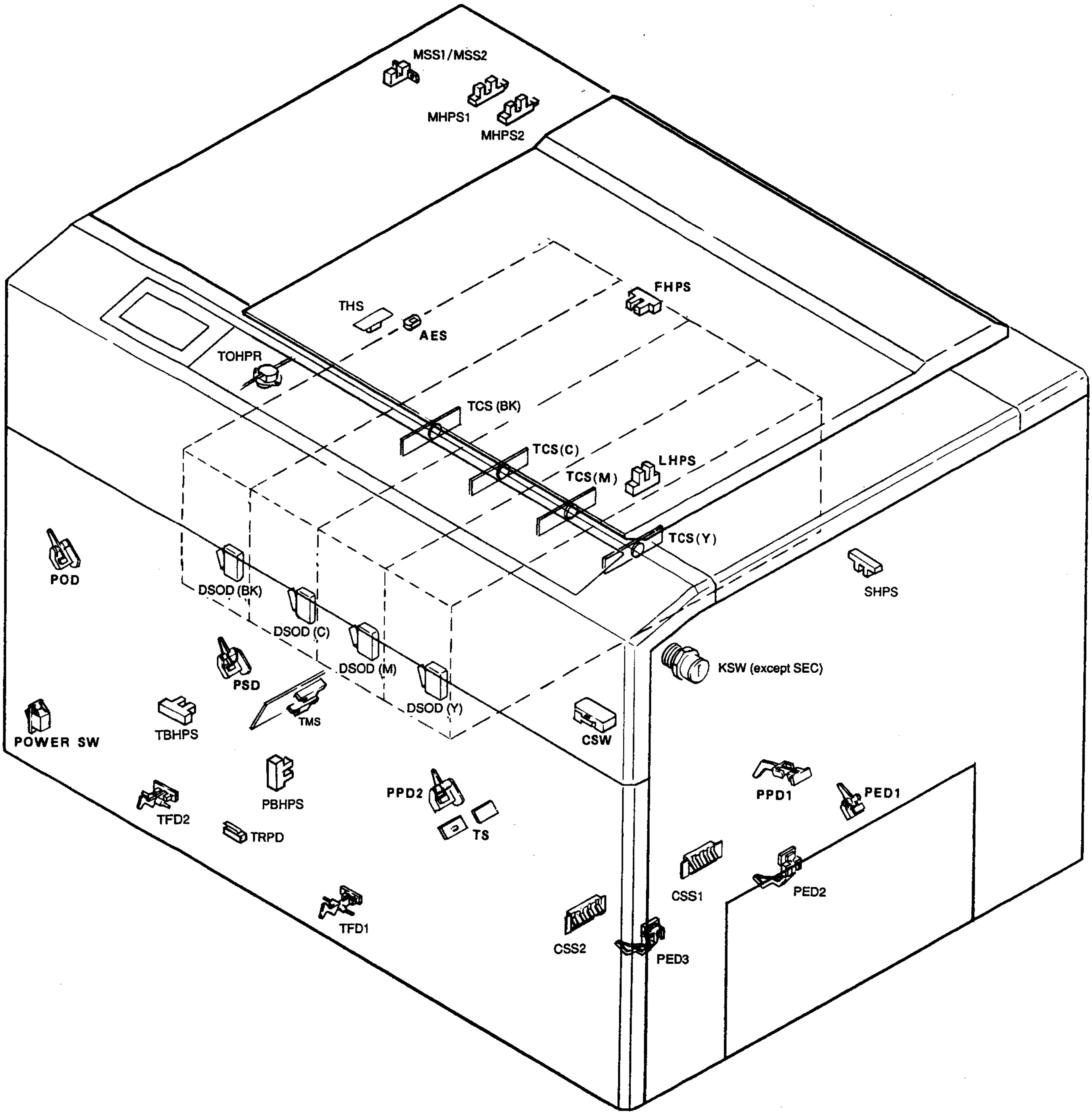
### (1) Internal view



| | | | | | |
|---|---|---|---|---|---|
| ① | Optical system cooling fan motor | ② | Mirror motor | ③ | No. 3 mirror |
| ④ | No. 2 mirror | ⑤ | Main copy lamp | ⑥ | AE sensor |
| ⑦ | No. 1 mirror | ⑧ | Pre-transfer discharge lamp (PDL) unit | ⑨ | Developer unit (BK, C, M, Y) |
| ⑩ | Optical filter (R, G, B, ND) | ⑪ | Zoom lens | ⑫ | Blank lamp unit (BL) |
| ⑬ | Lens home position sensor (LHPS) | ⑭ | Lens motor | ⑮ | No. 4 mirror |
| ⑯ | No. 5 mirror | ⑰ | Ozone filter (PC) | ⑱ | Main corona unit |
| ⑲ | PC belt | ⑳ | Manual paper feed table | ㉑ | Upper paper cassette |
| ㉒ | Lower paper cassette | ㉓ | Upper paper cassette paper feed roller | ㉔ | Discharge lamp (DL) unit |
| ㉕ | Lower paper cassette paper feed roller | ㉖ | PC belt cleaner unit | ㉗ | Paper pass detector in front of resist roller (PPD2) |
| ㉘ | Resist roller | ㉙ | TX belt | ㉚ | Secondary transfer roller |
| ㉛ | Primary transfer roller | ㉜ | Pressure roller | ㉝ | Suction fan |
| ㉞ | Suction belt | ㉟ | Lower cleaner roller | | Lower heat roller |
| ㊲ | Exit tray | ㊳ | Upper heat roller | ㊴ | Upper cleaner roller |
| ㊵ | Oil applying unit (Supply/applying roller) | ㊶ | TX belt cleaner unit | ㊷ | DV motor |
| ㊸ | Manual feed paper detector (PED1) | ㊹ | Upper paper cassette paper empty detector (PED2) | ㊺ | Upper paper cassette size sensor |
| ㊻ | Lower paper cassette paper empty detector (PED3) | ㊼ | Lower paper cassette size sensor | ㊽ | Paper separation detector (PSD) |
| ㊾ | Paper-out detector (POD) | ㊿ | Thermal fuse | (51) | Thermistor |
| (52) | Thermostat | (53) | Manual feed paper pass detector (PPD1) | (54) | Toner monitor (Gamma) sensor (TMS) |
| (55) | TX belt home position sensor (TBHPS) | (56) | PC belt home position sensor (PBHPS) | (57) | OHP sensor (TS) |
| (58) | TB cleaning roller | (59) | Screen | | |

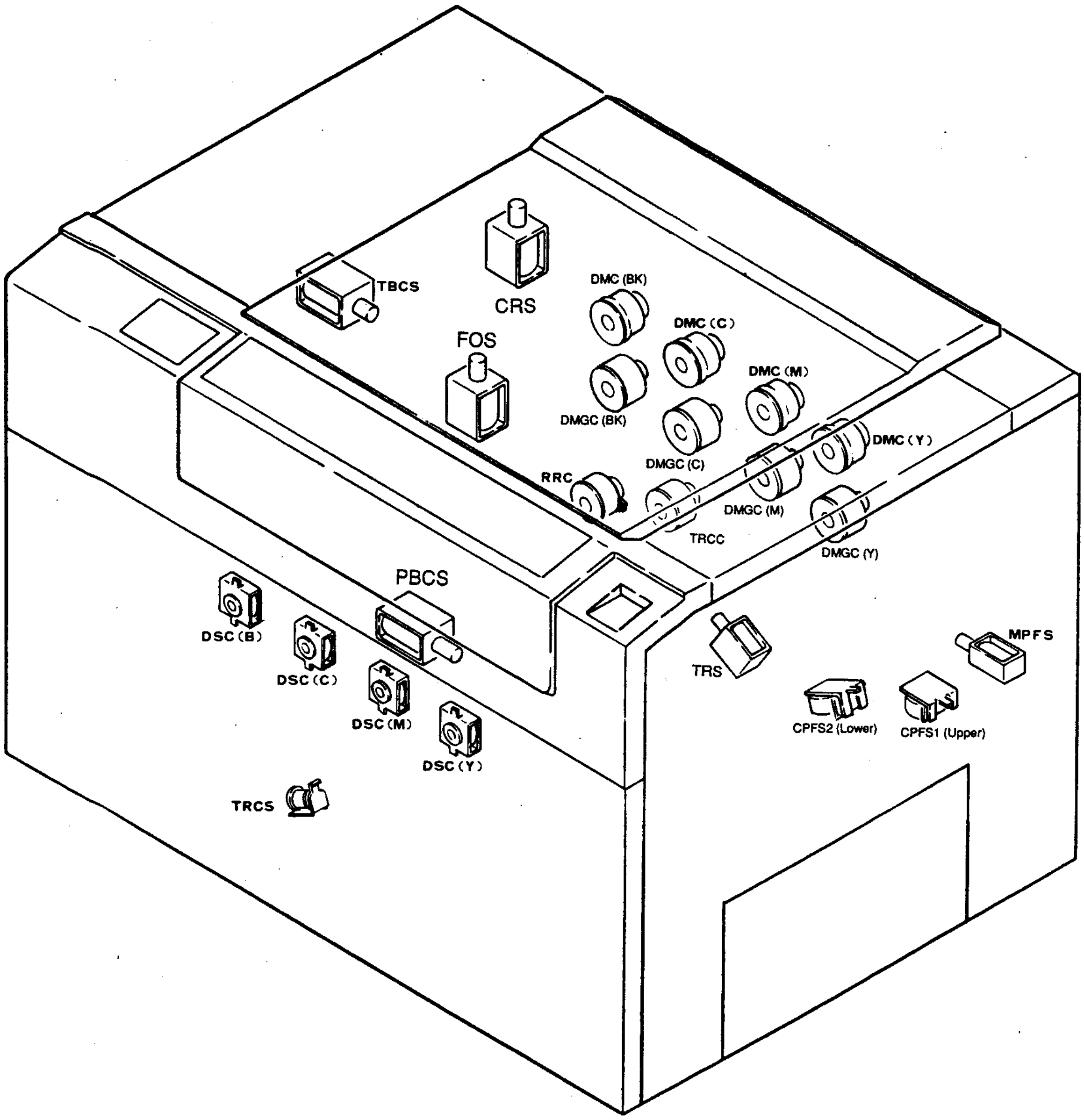
### (2) Switches, sensors, detectors

| Name | Type | Function | Level/Contact |
|---|---|---|---|
| CSW | Microswitch | Front exterior open/close detecting switch | ON when closed. |
| TBHPS | Transmission photosensor | TX belt home position sensor | LOW when home position is sensed. |
| PBHPS | Transmission photosensor | PC belt home position sensor | LOW when home position is sensed. |
| MHPS1 | Transmission photosensor | Mirror home position sensor 1 | HIGH when home position is sensed. |
| MHPS2 | Transmission photosensor | Mirror home position sensor 2 | HIGH when home position is sensed. |
| TCS(Y) | Magnetic sensor | Toner Y concentration sensor | Outputs voltage corresponding to the toner concentration. |
| TCS(M) | Magnetic sensor | Toner M concentration sensor | |
| TCS(C) | Magnetic sensor | Toner C concentration sensor | |
| TCS(BK) | Magnetic sensor | Toner B concentration sensor | |
| DSOD(Y) | Microswitch | Developing shutter Y open/close detector | HIGH when the shutter opens. |
| DSOD(M) | Microswitch | Developing shutter M open/close detector | |
| DSOD(C) | Microswitch | Developing shutter C open/close detector | |
| DSOD(BK) | Microswitch | Developing shutter B open/close detector | |
| PPD1 | Photo sensor | Manual feed paper pass detector | OFF when paper is detected. |
| PPD2 | Reed switch | Paper pass detector in front of resist roller | OFF when paper is detected. |
| PSD | Reed switch | Paper separation detector | OFF when paper is detected. |
| POD | Reed switch | Paper-out detector | OFF when paper is detected. |
| PED1 | Reed switch | Manual feed paper-in detector | OFF when paper is detected. |
| PED2 | Reed switch | Upper paper cassette paper empty detector | OFF when paper is detected. |
| PED3 | Reed switch | Lower paper cassette paper empty detector | OFF when paper is detected. |
| CSS1 | Push switch | Upper paper cassette size sensor | Switch is selected according to cassette size. |
| CSS2 | Push switch | Lower paper cassette size sensor | |
| TS | Transmission photosensor | OHP film sensor | LOW when OHP film is sensed. |
| Power SW | Seesaw SW | AC power switch | — |
| LHPS | Transmission photosensor | Lens home position sensor | HIGH when the lens is at position of 64% copy magnification ratio. |
| FHPS | Transmission photosensor | Filter home position sensor | HIGH when ND filter is sensed. |
| AES | Photo diode | Auto exposure sensor | Output varies according to the original brightness. |
| TMS | Reflection photosensor | Toner monitor sensor | Output voltage varies according to concentration. |
| TFD1 | Transmission photosensor | PC belt section toner full detector | LOW when toner full is detected. |
| TFD2 | Transmission photosensor | TX belt section toner full detector | |
| KSW | Key switch | Key switch (Except for SEC) | — |
| TRPD | Microswitch | Secondary transfer roller position detector | OFF when secondary transfer roller is tightly on paper. |
| MSS1<br>MSS2 | Transmission photosensor | Mirror base scan sensor | Mirror base scan length and scan direction are detected by slit disk rotation. |
| THS | Thermistor | | Terminal voltage varies according to upper fusing roller temperature. |
| TOHPR | Thermostat | Overheat protector | OFF when overheated. |
| SHPS | Transmission photosensor | Screen home position sensor | H level when home position is sensed. (Reset state) |


MSS1/MSS2
MHPS1
MHPS2
FHPS
THS
AES
TOHPR
TCS (BK)
TCS(C)
LHPS
TCS(M)
TCS(Y)
POD
SHPS
DSOD (BK)
DSOD (C)
PSD
DSOD (M)
KSW (except SEC)
DSOD (Y)
TMS
TBHPS
POWER SW
CSW
PBHPS
PPD2
PPD1
PED1
TFD2
TRPD
TS
CSS1
PED2
TFD1
CSS2
PED3

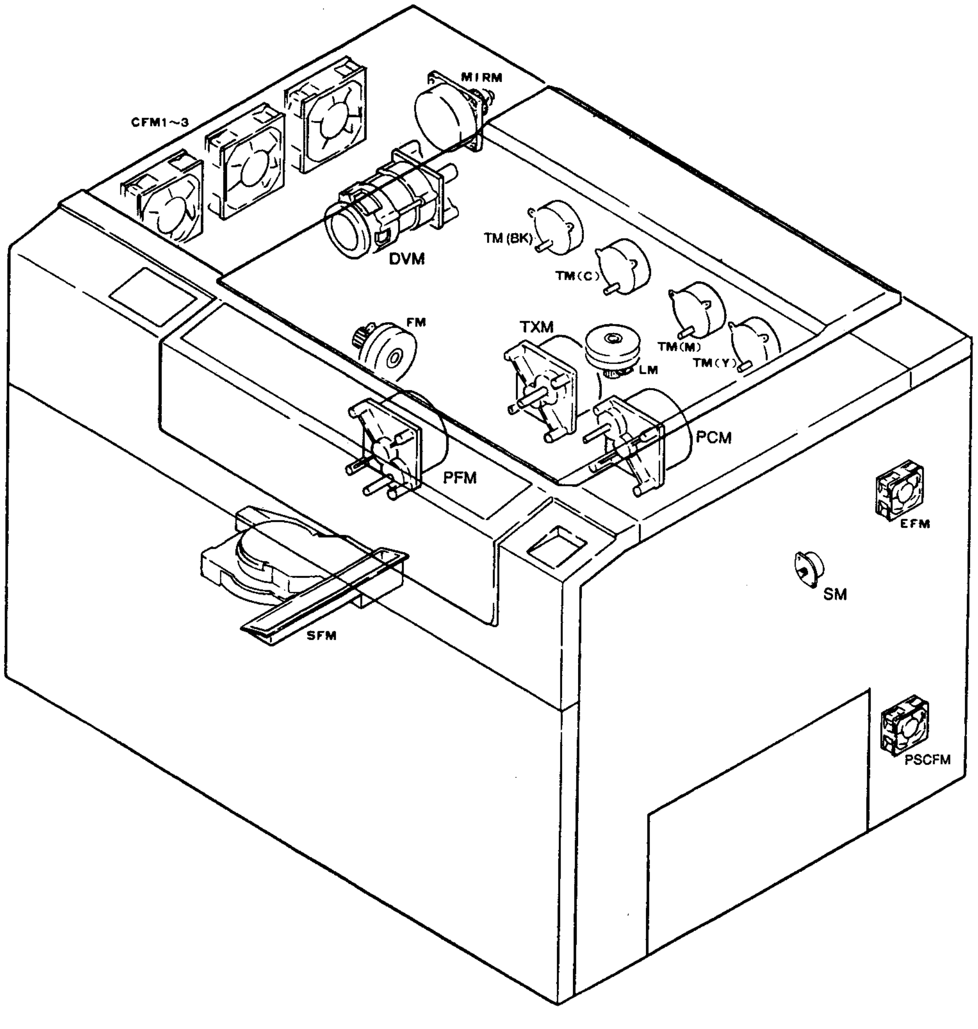
### (3) Solenoids and magnetic clutches

| Name | Type | Function |
|---|---|---|
| TBCS | Solenoid | TX belt cleaner blade solenoid<br>When the solenoid is ON, the cleaner blade is pressed on the TX belt. |
| PBCS | Solenoid | PC belt cleaner blade solenoid<br>When the solenoid is ON, the cleaner blade is pressed on the photoconductor belt. |
| DSC(Y) | Solenoid | Developer shutter clutch solenoid Y<br>Each time the solenoid is ON, the shutter is opened or closed. |
| DSC(M) | Solenoid | Developer shutter clutch solenoid M<br>Each time the solenoid is ON, the shutter is opened or closed. |
| DSC(C) | Solenoid | Developer shutter clutch solenoid C<br>Each time the solenoid is ON, the setter is opened or closed. |
| DSC(BK) | Solenoid | Developer shutter clutch solenoid B<br>Each time the solenoid is ON, the shutter is opened or closed. |
| DMC(Y) | Magnetic clutch | Developer stirring roller clutch Y<br>When the clutch is ON, the stirring shaft rotates. |
| DMC(M) | Magnetic clutch | Developer stirring roller clutch M<br>When the clutch is ON, the stirring shaft rotates. |
| DMC(C) | Magnetic clutch | Developer stirring roller clutch C<br>When the clutch is ON, the stirring shaft rotates. |
| DMC(BK) | Magnetic clutch | Developer stirring roller clutch BK<br>When the clutch is ON, the stirring shaft rotates. |
| DMGC(Y) | Magnetic clutch | Developer MG roller clutch Y<br>When the clutch is ON, the MG roller rotates. |
| DMGC(M) | Magnetic clutch | Developer MG roller clutch M<br>When the clutch is ON, the MG roller rotates. |
| DMGC(C) | Magnetic clutch | Developer MG roller clutch C<br>When the clutch is ON, the MG roller rotates. |
| DMGC(BK) | Magnetic clutch | Developer MG roller clutch BK<br>When the clutch is ON, the MG roller rotates. |
| MPFS | Solenoid | Manual paper feed clutch solenoid<br>When the solenoid is ON, the manual paper feed roller rotates. |
| CPFS1 | Solenoid | Upper paper cassette paper feed clutch solenoid<br>When the solenoid is ON, the upper cassette paper feed roller rotates. |
| CPFS2 | Solenoid | Lower paper cassette paper feed clutch solenoid<br>When the solenoid is ON, the lower cassette paper feed roller rotates. |
| TRS | Solenoid | Paper transport roller clutch solenoid<br>When the solenoid is ON, the transport roller rotates. |
| RRC | Magnetic clutch | Resist roller clutch<br>When the clutch is ON, the resist roller rotates. |
| FOS | Solenoid | Oil applying roller drive solenoid<br>When the solenoid is ON, oil applying roller is in contact with fusing roller. |
| TRCS | Solenoid | Secondary transfer roller drive clutch solenoid<br>When the solenoid is ON, secondary transfer roller is brought into contact with and then separated from the copy paper. |
| CRS | Solenoid | TB cleaning roller drive solenoid<br>When the solenoid is ON, TX belt is cleaned. |
| TRCC | Magnetic clutch | Transfer clutch when this clutch is ON, the transfer roller rotates. |

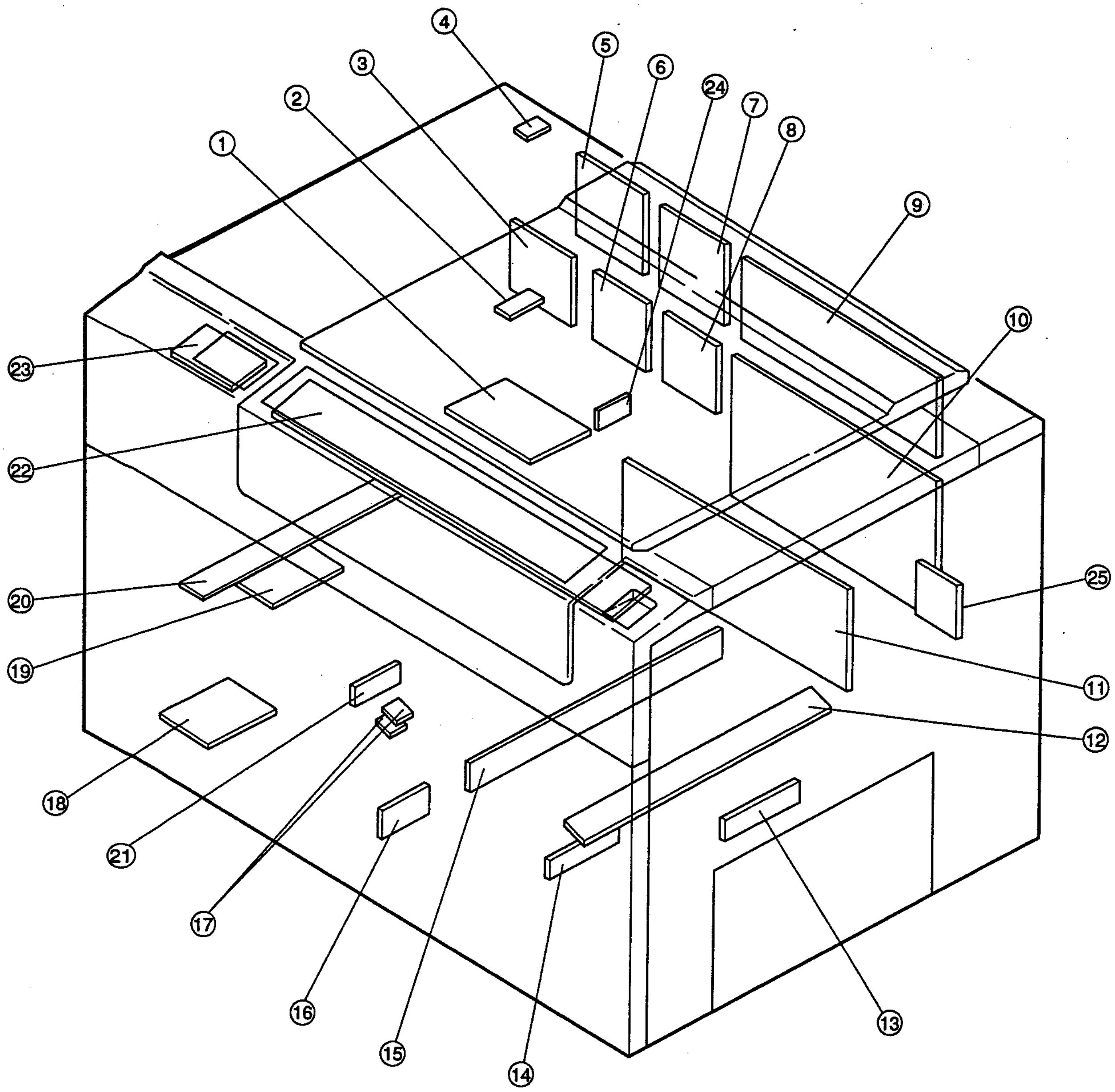

TBCS
CRS
DMC (BK)
DMC (C)
FOS
DMC (M)
DMGC (BK)
DMGC (C)
DMC (Y)
RRC
TRCC
DMGC (M)
DMGC (Y)
PBCS
DSC (B)
DSC (C)
DSC (M)
DSC (Y)
TRS
MPFS
CPFS2 (Lower)
CPFS1 (Upper)
TRCS

## (4) Motors

| Name | Type | Function |
|---|---|---|
| MIRM | 3-phase DC brushless servo motor | Mirror base driving motor<br>The motor speed is varied according to the copy magnification ratio. |
| TXM | 3-phase DC brushless servo motor | TX belt driving motor<br>The motor speed is varied according to the copy mode. |
| PCM | 3-phase DC brushless servo motor | PC belt driving motor<br>The motor speed is varied according to copy mode. |
| EFM | DC brushless motor | Exhaust fan motor |
| TM(Y) | AC synchronous motor | Toner Y supply motor |
| TM(M) | AC synchronous motor | Toner M supply motor |
| TM(C) | AC synchronous motor | Toner C supply motor |
| TM(BK) | AC synchronous motor | Toner B supply motor |
| PFM | 3-phase DC brushless servo motor | Paper transport system driving motor<br>The motor speed is varied according to the copy mode. |
| SFM | AC induction motor | Transport unit suction fan motor |
| DVM | AC induction motor | Developer unit driving motor |
| LM | Stepping motor | Lens shifting motor |
| FM | Stepping motor | Filter selecting motor |
| CFM1 ~ 3 | DC brushless motors | Optical unit cooling fan motor |
| SM | Stepping motor | Screen setting motor |
| PSCFM | DC brushless motor | Power supply cooling fan motor |

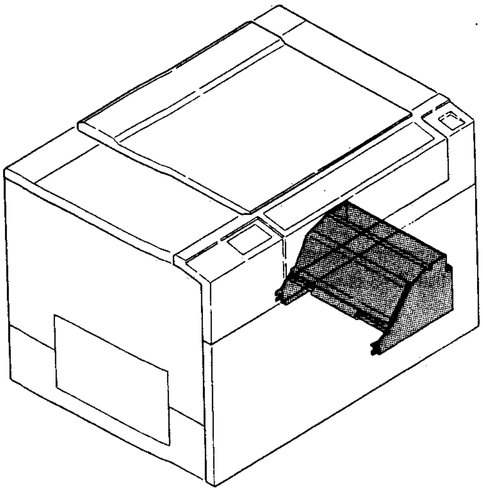


## (5) PWB arrangement



| | | | | | |
|---|---|---|---|---|---|
| ① | PF motor control PWB | ② | AE sensor PWB | ③ | TX belt motor control PWB |
| ④ | Mirror base scan sensor PWB (MSS1/MSS2) | ⑤ | Mirror motor control PWB | ⑥ | Toner motor control PWB |
| ⑦ | CL control PWB | ⑧ | PC belt motor control PWB | ⑨ | Slave PWB |
| ⑩ | Main PWB | ⑪ | DC power PWB | ⑫ | Discharge lamp (DL) PWB |
| ⑬ | Upper paper cassette size sensor PWB | ⑭ | Lower paper cassette size sensor PWB | ⑮ | Blank lamp PWB |
| ⑯ | Secondary TX high voltage generating PWB (SRHVG) | ⑰ | OHP film sensor PWB (GL, PT) | ⑱ | AC circuit PWB |
| ⑲ | Noise filter PWB | ⑳ | Pre-TX discharge lamp (PDL) PWB | ㉑ | Gamma sensor PWB |
| ㉒ | Operation PWB 1 | ㉓ | Operation PWB 2 | ㉔ | Primary TX high voltage generating PWB (FRHVG) |
| ㉕ | Main corona high voltage generating<br>Developing bias voltage generating PWB | | | | |

# [7] PAPER FEED BLOCK



## 1. General

The paper feed unit is used to carry paper onto the secondary TX block.

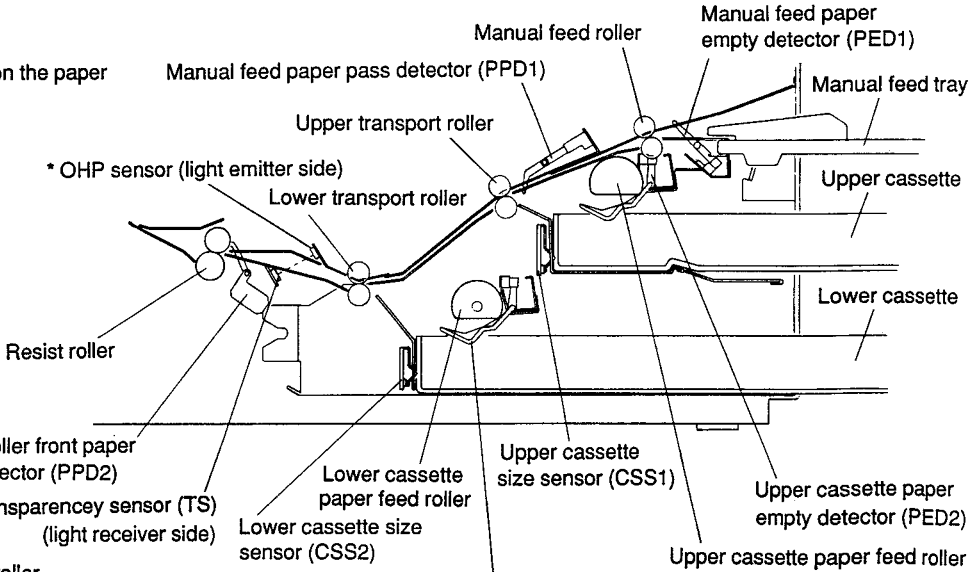
## 2. Specification

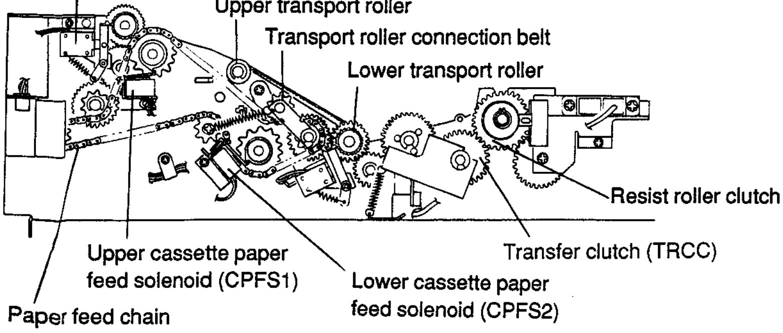
| Item / Method | Paper size | Paper weight | Paper kind | Capacity |
|---|---|---|---|---|
| Manual feed | A3~B5 (11" x 17"~8-1/2" x 5-1/2")<br>Paper above 105g/m$^2$ (90Kg) (24 lbs) must be not larger than A4 | 60~128g/m$^2$<br>(52~110kg)<br>(16~28 lbs) | Plain paper<br>OHP film | Single copy |
| | For (8-1/2" x 11") and 8-1/2"x5-1/2 | (16~34 lbs) | | |
| Cassette feed | A3~B5 (11" x 17" ~ 8-1/2" x 5-1/2") | 60~85g/m$^2$<br>(52~73kg)<br>(16~22 lbs) | Plain paper | About 250 sheets |

NOTE: Double sided copy and image overlay are not possible.

## 3. Construction

*NOTE: OHP sensors are not mounted on the paper feed unit.


Manual feed roller
Manual feed paper empty detector (PED1)
Manual feed paper pass detector (PPD1)
Manual feed tray
Upper transport roller
Upper cassette
* OHP sensor (light emitter side)
Lower transport roller
Lower cassette
Resist roller
Resist roller front paper pass detector (PPD2)
* Transparencey sensor (TS) (light receiver side)
Lower cassette paper feed roller
Lower cassette size sensor (CSS2)
Upper cassette size sensor (CSS1)
Upper cassette paper empty detector (PED2)
Upper cassette paper feed roller
Lower cassette paper empty detector (PED3)


Manual paper feed solenoid (MPFS)
Upper transport roller
Transport roller connection belt
Lower transport roller
Resist roller clutch
Transfer clutch (TRCC)
Upper cassette paper feed solenoid (CPFS1)
Lower cassette paper feed solenoid (CPFS2)
Paper feed chain

# 4. Major parts and functions

## (1) Manual feed paper empty detector (PED1)

A reed switch is used for this detector to sense presence of paper in the manual feed unit. The switch turns off when paper is detected.
Manual feed operation of the machine is controlled with the signal from this detector.

## (2) Upper cassette paper empty detector (PED2)

A reed switch is used for this detector to sense presence of paper in the cassette. The switch turns off when paper is detected.

## (3) Lower cassette paper empty detector (PED3)

A reed switch is used for this detector to sense presence of paper in the cassette. The switch turns off when paper is detected.

## (4) Upper cassette size sensor (CSS1)

Four push switches are used for this sensor to sense the size of cassette used. Cassette size is determined by what switches are actuated and deactuated.

## (5) Lower cassette size sensor (CSS2)

Four push switches are used for this sensor to sense the size of cassette used.

## (6) Manual feed paper pass detector (PPD1)

A photo interupter is used for this detector to sense paper in the manual feed tray.
The switch turns off when a paper is detected.
Paper in the manual feed tray is transported based on the state of this signal.
Paper misfeed is established when this detector remains off, after the actuation of PED1.

## (7) Resist roller paper pass detector (PPD2)

A reed switch is used to detect the paper lead edge before the resist roller.
The detector turns off when paper is detected.
The transport roller off timing is determined based on the state of this signal.

Paper misfeed is established when the detector remains off.

## (8) Transparency sensor (TS)

A transmission photosensor consisting of an LED and phototransistor is used for this sensor to detect presence of OHP film or normal paper.
The output signal goes low when OHP film is detected.

## (9) Manual feed roller

This roller is used to feed paper from the manual feed tray.
The roller rotates when paper is detected by the manual feed paper empty detector (PED1).

## (10) Upper cassette paper feed roller

A half-moon roller is used to feed paper from the upper cassette.

## (11) Lower cassette paper feed roller

A half-moon roller is used to feed paper from the lower cassette.

## (12) Upper transport roller

This roller is used to transport paper from the manual feed tray or upper cassette. This roller rotates in conjunction with the Lower transfer roller via the belt.

## (13) Lower transport roller

This roller is used to transport paper from the lower cassette, upper cassette or the manual feed tray. This roller starts to rotate immediately upon activation of the TRS solenoid and stops rotating at a prescribed time after the paper lead edge is detected by PPD1. (The turn off time of the TRS is determined by the setting in test command 54)

## (14) Resist roller

This roller is used to minimize paper skew within the paper feed unit and to correctly register the paper lead edge with the image lead edge on the TX belt at the secondary transport roller. The copy lead edge image loss and void area are dependent on the time the roller starts to rotate which is adjusted using the test command 50 (RRC-A).

## (15) Manual paper feed clutch/solenoid (MPFS)

A spring clutch is used to control the rotation of the manual feed roller.
When the solenoid is activated, the clutch engages to rotate the manual feed roller.

## (16) Upper cassette paper feed clutch/cassette feed solenoid (CPFS1)

A spring clutch is used to control the rotation of the upper cassette feed roller.
When the solenoid is activated, the clutch engages to rotate the upper cassette feed roller.

## (17) Lower cassette paper feed clutch/cassette feed solenoid (CPFS2)

A spring clutch is used to control the rotation of the lower cassette feed roller.
When the solenoid is activated, the clutch engages to rotate the lower cassette feed roller.

## (18) Lower transport roller clutch/lower transport roller solenoid (TRS)

A spring clutch is used to control the rotation of the lower transport roller.
When the solenoid is activated, the clutch engages to rotate the lower transport roller.
Since spring clutch and solenoid are not used for the upper transport roller, the rotation of the PA motor is directly conveyed to rotate.

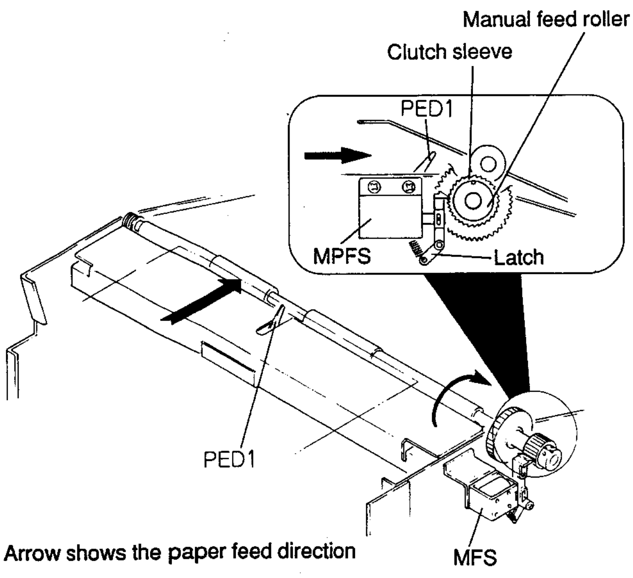
## (19) Resist roller clutch (RRC)

A magnetic clutch is used to control the rotation of the resist roller.

When the clutch is activated, the resist roller rotates.

## 5. Operational theory

### (1) Manual feed

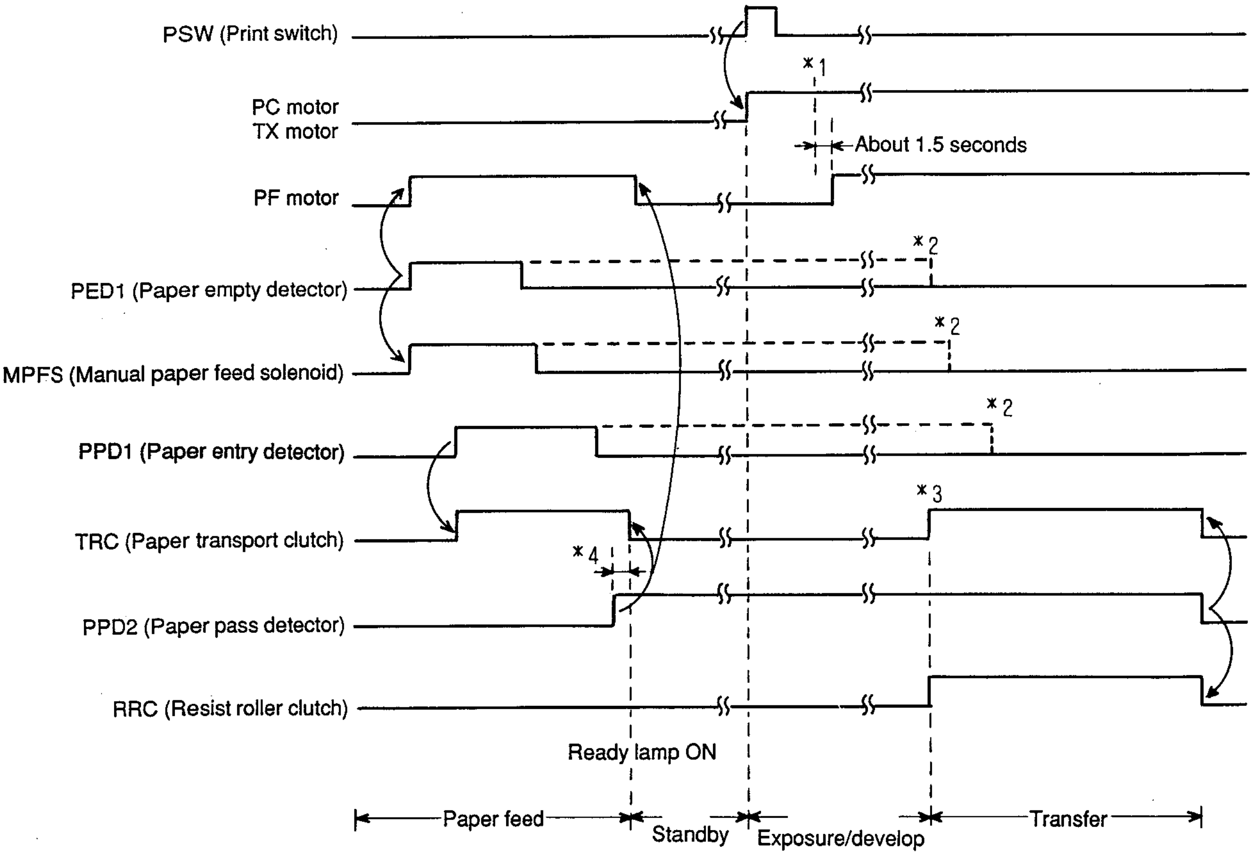


Arrow shows the paper feed direction

When paper is placed in the manual feed tray, the paper empty detector (PED1) is actuated and the PF motor starts to run. At the same time, the manual feed solenoid (MPFS) activates to release the latch from the teeth of the clutch sleeve.

With this the clutch is activated and the manual feed roller starts rotating to feed the paper.

[Timing chart]



NOTES:

1: TX belt/photoconductor belt seam match complete.

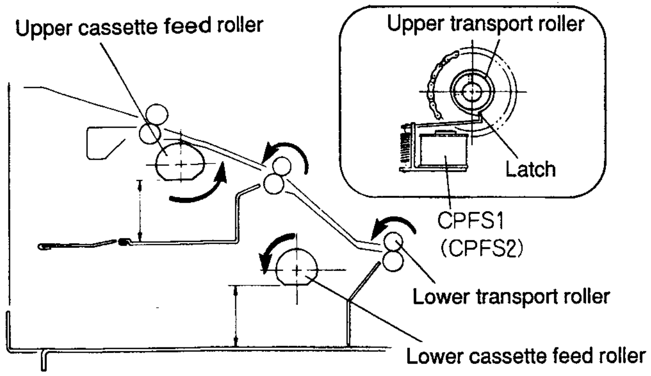
2: A3 or 11" x 17" paper in use

3: TRC actuation timing is controlled so that the lead edge of the image area on the TX belt should come over the transfer roller at the same time as the lead edge of the paper.

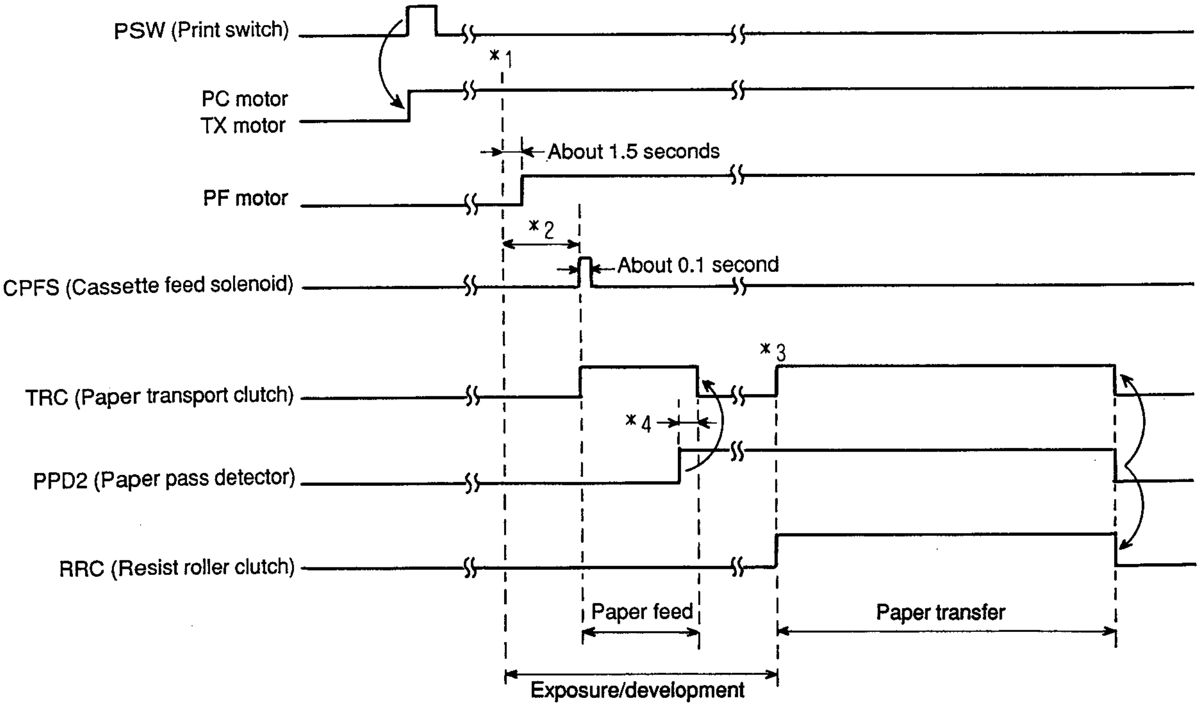
4: TRC de-activates within a specified delay after paper is detected by the PPD2 sensor. (controled by test command 54). This delay in time causes the required buckle at the resist rollers to minimize any paper skew as the resist rollers are not rotating.

## (2) Cassette feed

When the print switch is actuated, the PC and TX motors turn on. They continue to rotate until the seams in both the PC and TX belts are aligned (in synchronization). 1.5 seconds after seam alignment is achieved the PF motor turns on. 3.5 to 8.4 seconds after seam alignment the CPFS corresponding to the paper cassette selected is activated for a period of 100msec. This releases the latch from the clutch sleeve and causes the correct paper feed roller to rotate and feed paper.


Upper cassette feed roller
Upper transport roller
Latch
CPFS1
(CPFS2)
Lower transport roller
Lower cassette feed roller

[Timing chart]


PSW (Print switch)
*1
PC motor
TX motor
About 1.5 seconds
PF motor
*2
About 0.1 second
CPFS (Cassette feed solenoid)
*3
TRC (Paper transport clutch)
*4
PPD2 (Paper pass detector)
RRC (Resist roller clutch)
Paper feed
Paper transfer
Exposure/development

NOTES:

1: TX belt/photoconductor belt seam match complete

2: The following time may be required until the CPFS turns on after completion of belt seam matching.

| | Full color | Monochrome (R,G,B) | Black and white/ monochrome (Y,M,C) |
|---|---|---|---|
| CPFS1 | 7.9sec | 5.2sec | 3.5sec |
| CPFS2 | 8.4sec | 5.7sec | 4.0sec |

3: TRC actuation timing is controlled so that the lead edge of the image area on the TX belt should come over the transfer roller at the same time as the lead edge of the paper.

4: TRC de-activates within a specified delay afier paper is detected by the PPD2 sensor. (controled by test command 54) This delay in time causes the required buckle at the resist rollers to minimize any paper skew. When the resist rollers are not rotating.

## (3) Paper transport speed

In order to obtain stable fusing results, three fuser speeds are used, depending on whether paper or OHP film is used, paper size and the copy mode selected.

The same motor (PF motor) is used for paper transfer and fuser speeds. Paper transfer speed is synchronized with the processor speed (TX belt and photoconductor belt speeds) to prevent a deviation between the TX image and copy image.

| Paper kind | Sensor state (*3) | | | Fuser speed (mm/s) | | Process speed, paper transport speed (mm/s) | |
|---|---|---|---|---|---|---|---|
| | PPD2 | OHP sensor | PPD1 | Monochrome (Y,M,C) and black/white copy | Monochrome (R,G,B) and full color copy | Monochrome (Y,M,C) and black/white copy | Monochrome (R,G,B) and full color copy |
| OHP film | | ON | | 60 | | 60 | |
| Plain paper > A4 (*1) or letter | ON | OFF | ON | 184 | 115 | 184 | 115 |
| Plain paper ≦ (*2) or letter | ON | OFF | OFF | 184 | 115 | 184 | 184 (*4) |

NOTES:

*1: Paper size longer than 216mm in the direction of paper transport through the machine. If a universal cassette is used, any paper size is assumed to be longer than 216mm for the first copy run cycle (single or multiple). After first cycle if paper less than 216mm is used, transportation speed will be increased.

*2: Paper whose transporting direction length is 216mm or less

*3: In the case of manual feed, the paper size is detected by the state of the manual feed paper pass detector (PPD1) when the resist roller paper pass detector (PPD2) actuated.

*4: Because this paper is shorter than the distance between the transfer roller and fuser roller, it would be possible to control the fuser speed and the transfer speed separately. Thus, the speed of the PF motor is increased after the completion of transfer in order to maintain copy speed.

# 6. Major parts disassembly, re-assembly, replacement, cleaning

## A. List

| | | Parts name | When cleaning required | Refer page |
|---|---|---|---|---|
| (1) | | Paper feed unit | | 7-5 |
| (2) | | Switches | | |
| | a | Manual feed paper empty detector (PED1) | | 7-6 |
| | b | Manual feed paper pass detector (PPD1) | | 7-6 |
| | c | Upper cassette paper empty detector (PED2) | | 7-6 |
| | d | Lower cassette paper empty detector (PED3) | | 7-7 |
| | e | Upper cassette size sensor (CSS1) | | 7-7 |
| | f | Lower cassette size sensor (CSS2) | | 7-7 |
| | g | Resist roller paper pass detector (PPD2) | | 7-7 |
| | h | OHP sensor (receiver) | At every maintenance | 7-8 |
| | i | OHP sensor (emitter) | At every maintenance | 7-8 |
| (3) | | Rollers | | |
| | a | Upper cassette paper feed roller | At every maintenance | 7-8 |
| | b | Lower cassette paper feed roller | At every maintenance | 7-9 |
| | c | Upper transport roller | At every maintenance | 7-9 |
| | d | Lower transport roller | At every maintenance | 7-10 |
| | e | Manual paper feed roller | At every maintenance | 7-10 |
| | f | Lower resist roller | At every maintenance | 7-10 |

## B. Method

### (1) Paper feed unit removal

① Remove the side panel on the paper entry side.

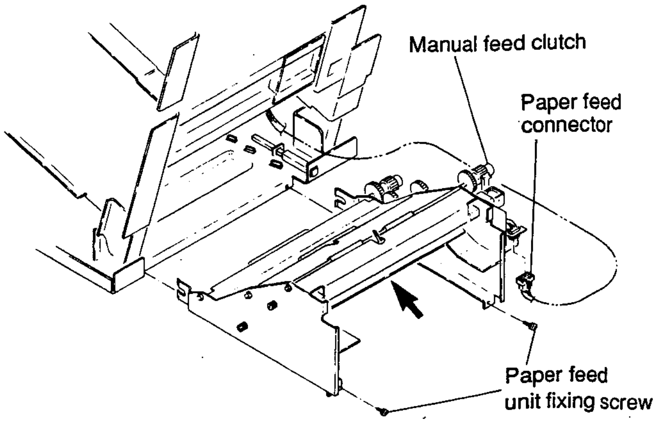
② Open the clamshell.

③ Unfasten the paper feed connector.

④ Remove the two screws that secure the paper feed unit to the baseplate.

⑤ Lift up in the area of the arrow and gently take out the unit.

NOTE: Do not allow the manual feed clutch to contact other parts, when removing the unit



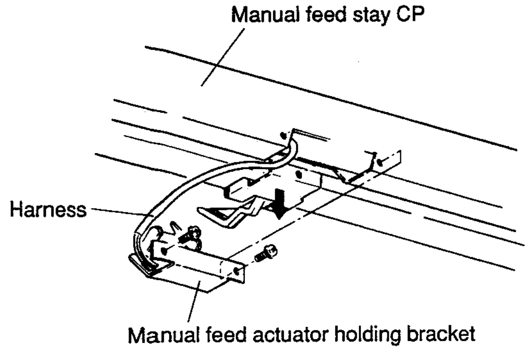
## (2) Switch replacement

### a. Manual feed paper empty detector (PED1)

① Remove the paper feed unit.

② Remove the two screws that hold the PED1 sensor holding bracket.

③ Remove the PED1 cable from the manual feed stay CP and unfasten the connector.


Manual feed stay CP
Harness
Manual feed actuator holding bracket

### b. Manual feed paper pass detector (PPD1)

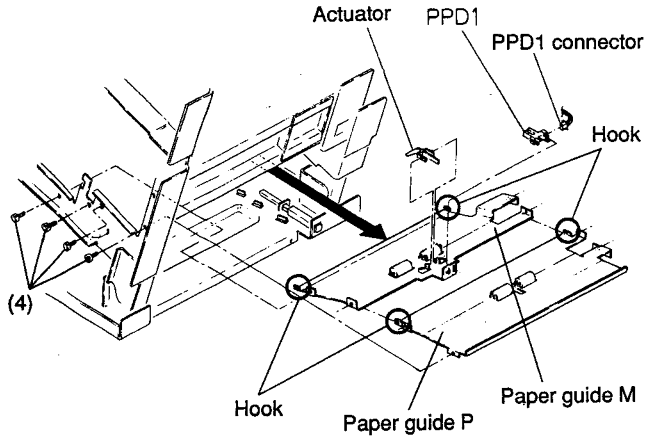
① Remove the paper feed unit.

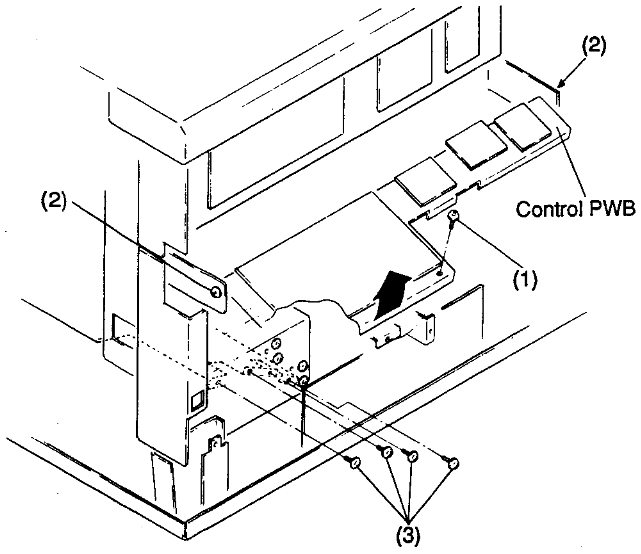
② Remove the rear panel.

③ Loosen the main PWB holding screw (1), loosen (Do not remove) the two screws that hold it (2), then lift up the main PWB.

④ Remove the four screws that hold the paper guide (P and M) on the rear frame side (3).

⑤ Remove the four screws that hold the paper guide (P and M) on the front frame side (4).


Actuator
PPD1
PPD1 connector
Hook
(4)
Hook
Paper guide P
Paper guide M


(2)
(2)
Control PWB
(1)
(3)

⑥ Disengage the HOOK, then remove the paper guide (P and M).

IMPORTANT: Do not deform the hook area.

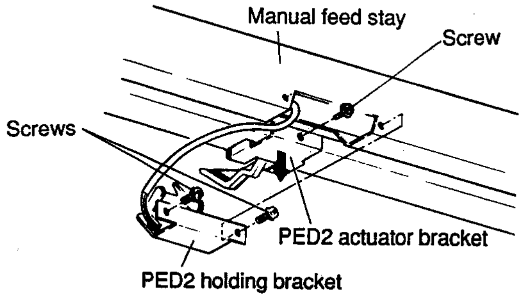
⑦ Unfasten the PPD1 connector and remove the PPD1 and the actuator.

### c Upper cassette paper empty detector (PED2)

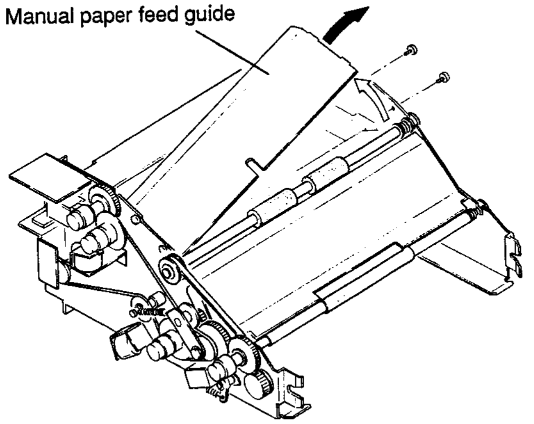
① Remove the paper feed unit.

② Remove the PED2 holding bracket without disconnecting the harness (2 screws).

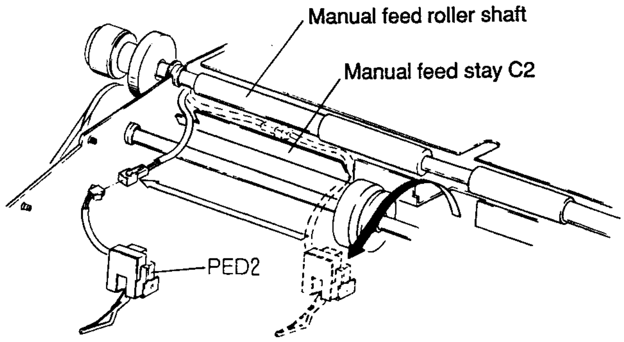
③ Remove the PED2 actuator bracket holding screw.


Manual feed stay
Screw
Screws
PED2 actuator bracket
PED2 holding bracket

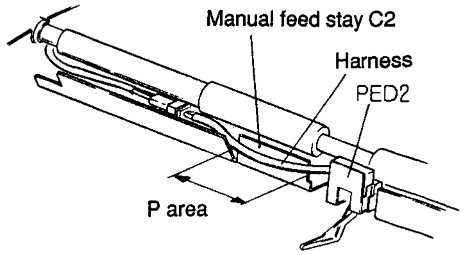
④ Remove the two screws that hold the manual feed paper guide on the paper feed unit front frame side then remove the manual feed paper guide in the direction of the arrow.


Manual paper feed guide

⑤ Remove the PED2 harness from between the manual feed roller shaft and the manual feed stay C2, then unfasten the connector.


Manual feed roller shaft
Manual feed stay C2
PED2

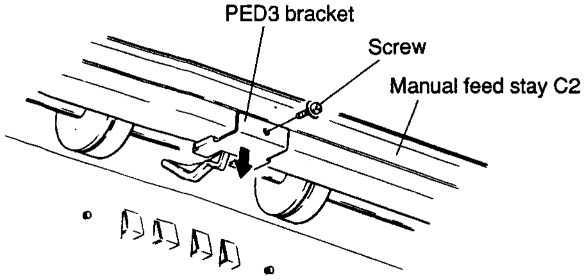
NOTE: When reinstalling the PED2 sensor, be sure to route the harness as shown below.


Manual feed stay C2
Harness
PED2
P area

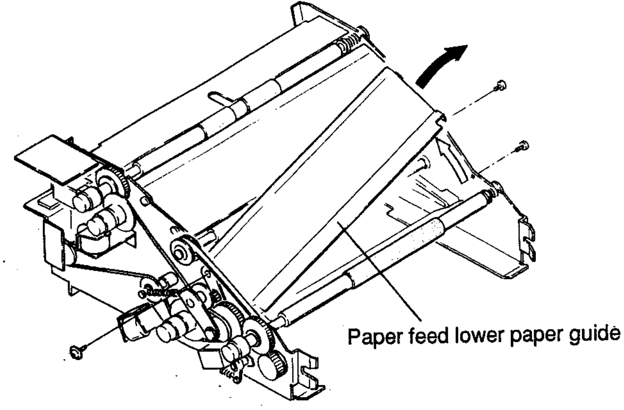
### d. Lower cassette paper empty detector (PED3)

① Remove the paper feed unit.

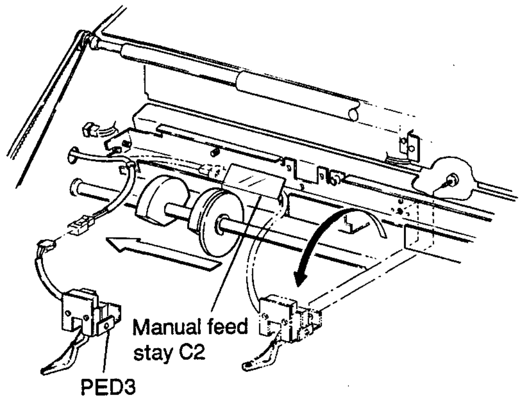
② Remove the PED3 holding bracket screw.


PED3 bracket
Screw
Manual feed stay C2

③ Remove the two screws that hold the upper cassette paper guide to the paper feed unit front frame side and the one screw on the rear frame side, then remove the paper feed lower paper guide as shown.


Paper feed lower paper guide

④ Remove the PED3 harness through the clearance in the manual feed stay C2, then unfasten the connector.


Manual feed stay C2
PED3

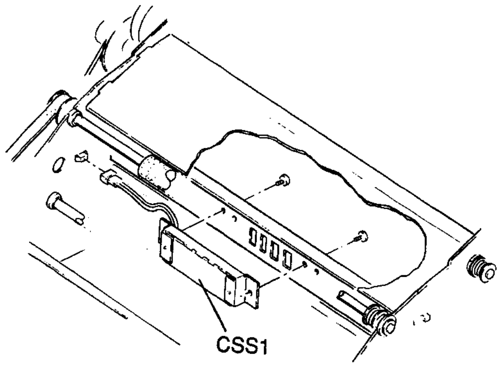
NOTE: The PED3 harness must be routed through the stay in the same manner as the PED2 harness as shown on page 7-6.

### e. Upper cassette size sensor (CSS1)

① Remove the paper feed unit.

② Remove the paper feed rear lower paper guide, in reference to "d-③"

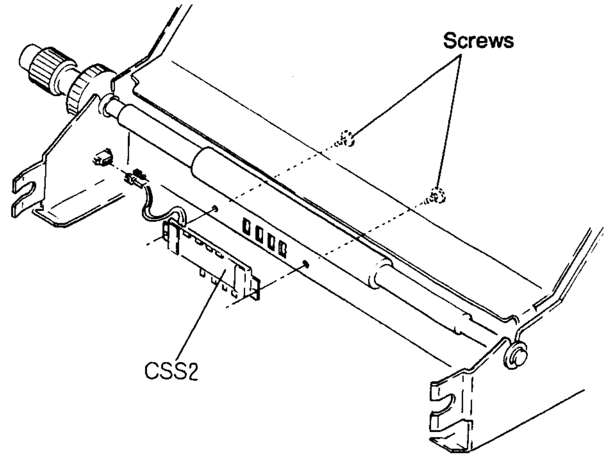
③ Remove the two screws and unfasten the connector, then remove the CSS1.



### f. Lower cassette size sensor (CSS2)

① Remove the paper feed unit.

② Remove the two screws and unfasten the sensor, then remove the CSS2.


Screws
CSS2

### g. Resist roller paper pass detector (PPD2)

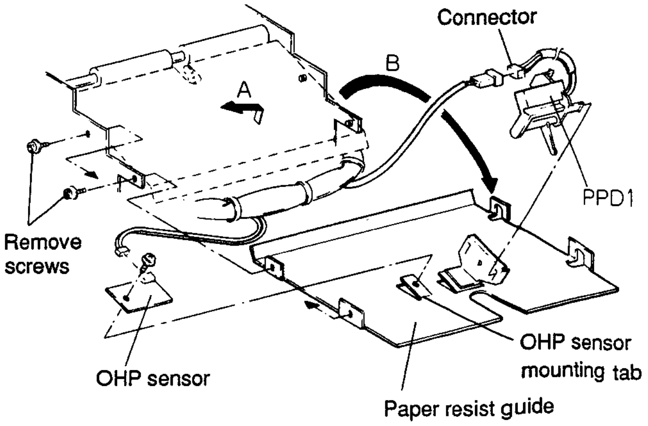
① Remove the paper feed unit.

② Open the clamshell.

③ Remove the two screws on the front frame side that hold the paper stop guide, then remove the paper stop guide in the direction of arrow A.

③ Invert the paper stop guide toward the direction of arrow B.

④ Unfasten the connector and remove the PPD2.


Connector
B
A
PPD1
Remove screws
OHP sensor
OHP sensor mounting tab
Paper resist guide

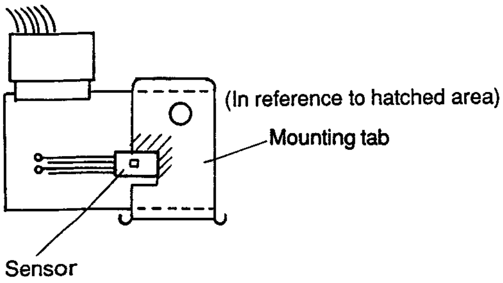
### h. Transparency sensor (OHP sensor) receiver (TS)

① Remove the paper resist guide.

② Remove the OHP sensor holding screw and remove the OHP sensor, in reference to the preceding figure.

[Hints for re-assembly of the OHP sensor]

- Install the OHP sensor in alignment to the hatched area.
- Adjustment is required after the installation was done. See Page 7-12.

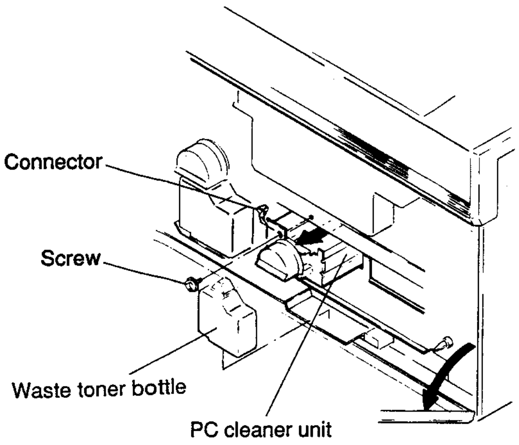

(In reference to hatched area)
Mounting tab
Sensor

### i. Transparency sensor (OHP sensor) emitter (TSL)

① Open the front panel.

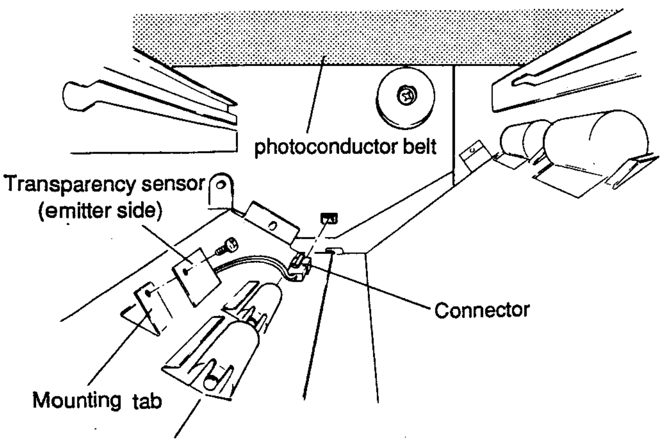
② Remove the PC waste toner bottle.

③ Remove the one screw that holds the PC cleaner unit and unfasten the connector, then remove the PC cleaner unit toward you.


Connector
Screw
Waste toner bottle
PC cleaner unit

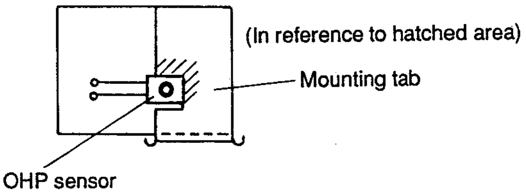
④ Remove the one screw that holds the transparency sensor and unfasten the connector, then remove the transparency sensor.

NOTE: Do not touch the photoconductor belt.


photoconductor belt
Transparency sensor
(emitter side)
Connector
Mounting tab

[Hints for re-assembly of the TS]

- Install the TS in alignment to the hatched area.
- Adjustment is required after the installation was done. See Page 7-12.

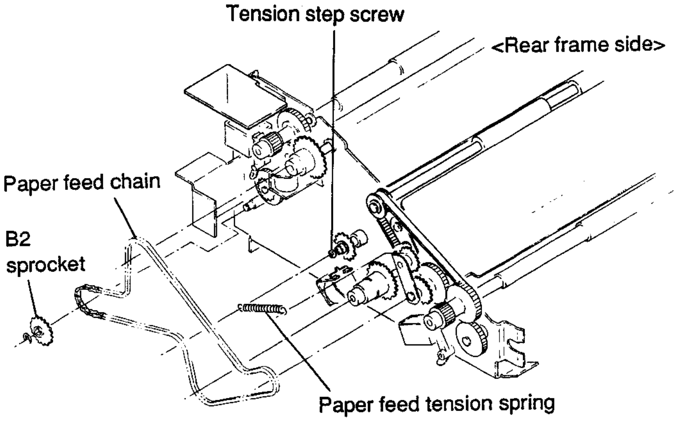

(In reference to hatched area)
Mounting tab
OHP sensor

## (3) Rollers

The paper feed unit must be removed before the following jobs are done. See Paragraph (1)-①~⑤ for removal of the paper feed unit.

### a. Upper cassette paper feed roller

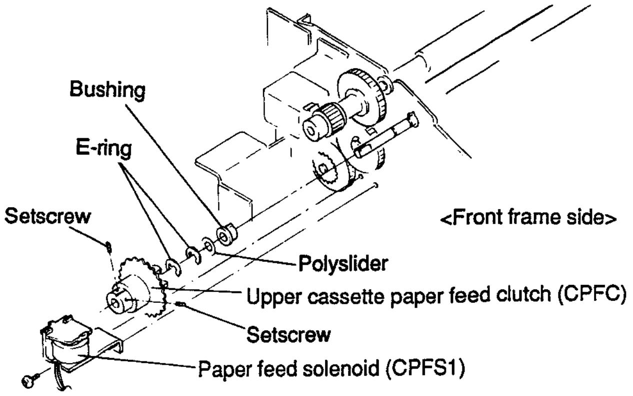
① Remove the B2 sprocket, and the paper feed tension spring, then remove the paper feed chain.


Tension step screw
<Rear frame side>
Paper feed chain
B2
sprocket
Paper feed tension spring

② Remove the upper cassette paper feed solenoid CPFS1 (1 screw).

③ Loosen the two setscrews, then remove the upper cassette paper feed clutch (CPFC1).

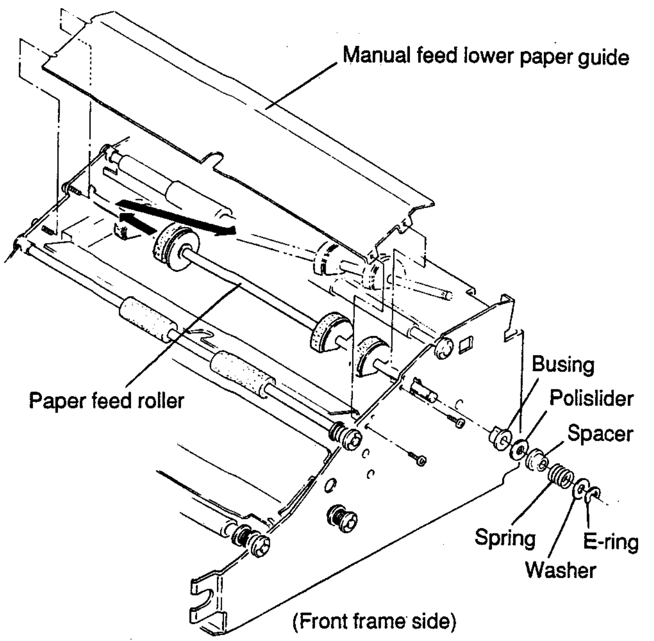
④ Remove the 2 E-rings, polyslider and bushing.


Bushing
E-ring
Setscrew
<Front frame side>
Polyslider
Upper cassette paper feed clutch (CPFC)
Setscrew
Paper feed solenoid (CPFS1)

⑤ Remove the front frame side E-ring, washer, spring, spacer, polyslider and bushing.

⑥ Remove the two screws then hold the manual feed lower paper guide to the paper feed unit.

⑦ Remove the manual feed lower paper guide and the paper feed roller in the directions shown.


Manual feed lower paper guide
Busing
Polislider
Spacer
Paper feed roller
Spring
E-ring
Washer
(Front frame side)

[Installation hints]

- Adjustment is required after the installation of the CPFS1 and the CPFC1. (page 7-10)

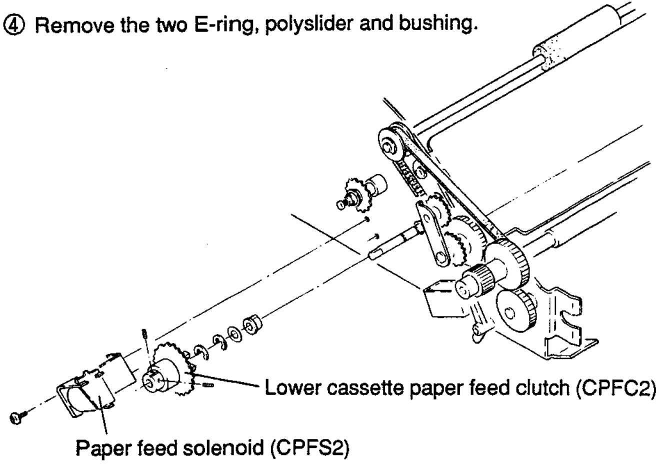
### b. Lower cassette paper feed roller

① Remove the paper feed unit, and remove the paper feed chain.

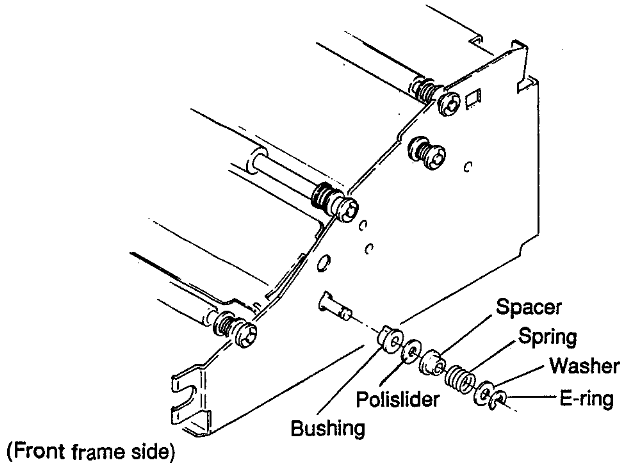
② Remove the lower cassette paper feed solenoid (CPFS2).

③ Loosen the two setscrews, then remove the lower cassette paper feed clutch (CPFC2).

④ Remove the two E-ring, polyslider and bushing.

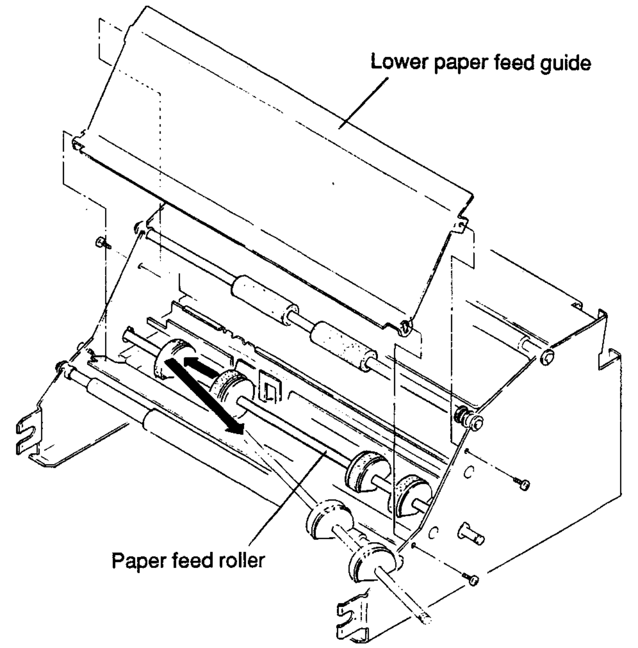

Lower cassette paper feed clutch (CPFC2)
Paper feed solenoid (CPFS2)

⑤ Remove the E-ring, washer, spring, spacer, polyslider and bushing consecutively.


Spacer
Spring
Washer
Polislider
E-ring
Bushing
(Front frame side)

⑥ Remove the three screws that hold the lower paper guide to the paper feed unit.

⑦ Remove the lower pager guide and the paper feed roller in the directions shown.

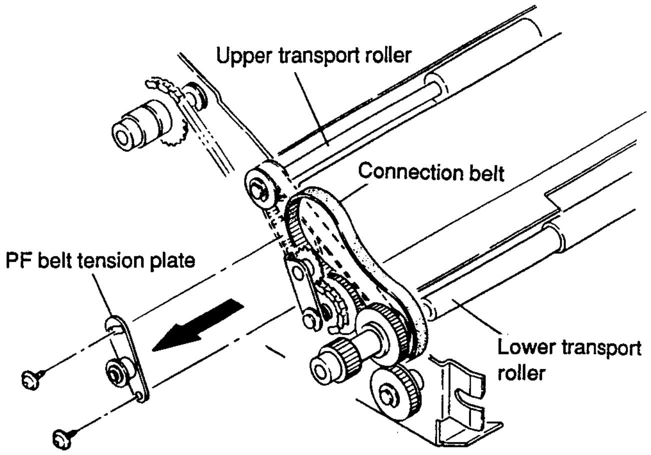

Lower paper feed guide
Paper feed roller

[Installation hints]

- Adjustment is required after the installation of the CPFS2 and the CPFC2. See Page 7-11.

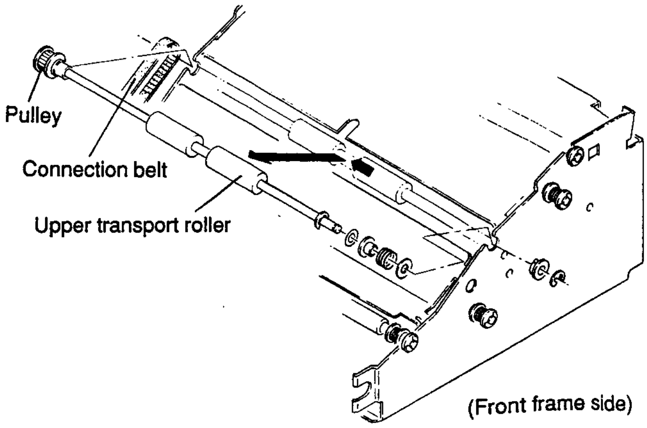
### c. Upper transport roller

① Remove the connection belt from the upper and lower transport rollers.


Upper transport roller
Connection belt
PF belt tension plate
Lower transport roller

② Remove the front frame side E-ring and the bushing.

③ While moving the upper transport roller towards the rear frame, remove it in the directions shown.

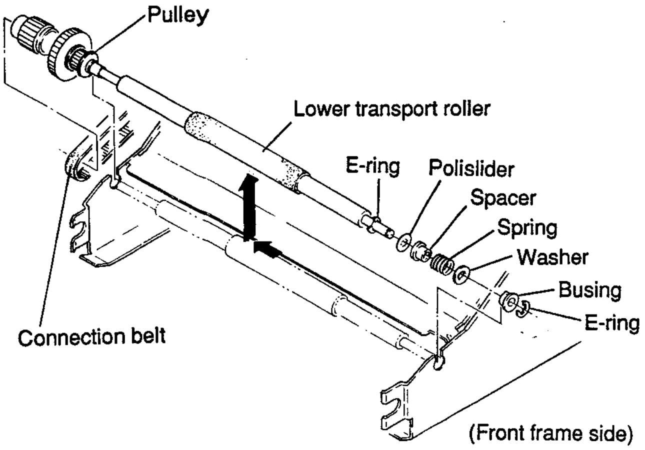

Pulley
Connection belt
Upper transport roller
(Front frame side)

### d. Lower transport roller

① Loosen the two fixing screws of the PF tension plate to release the connection belt tension, and remove the connection belt from the pulley on the lower transport roller shaft.

② Remove the front frame side E-ring and the bushing, and remove the lower transport roller is the directions shown.

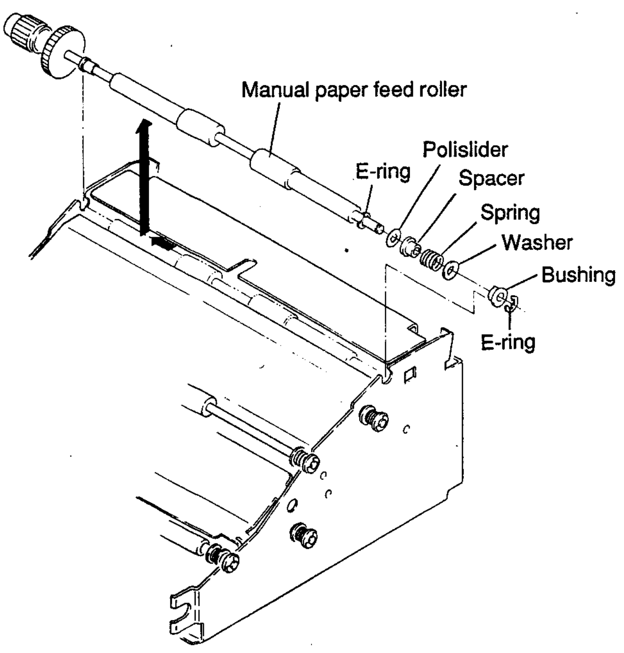
NOTE: The position of the polysilder, spacer, spring and washer for correct replacement.


Pulley
Lower transport roller
E-ring
Polislider
Spacer
Spring
Washer
Busing
E-ring
Connection belt
(Front frame side)

### e. Manual paper feed roller

① Remove the front frame side E-ring and the bushing, and remove the manual paper feed roller in the directions shown.

NOTE: The position of the polysilder, spacer, spring and washer for correct replacement.


Manual paper feed roller
Polislider
E-ring
Spacer
Spring
Washer
Bushing
E-ring

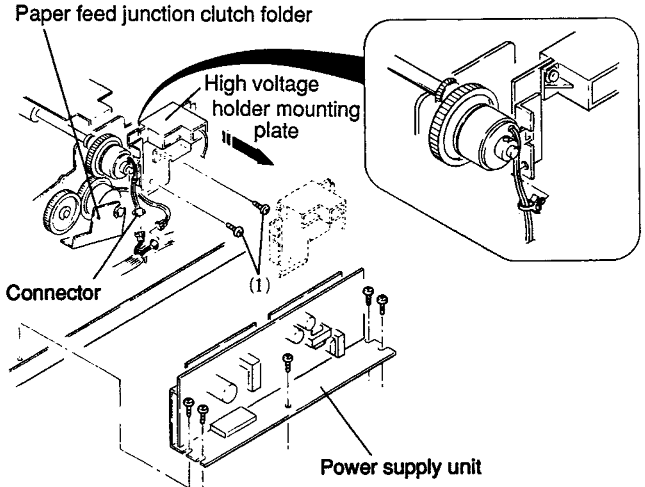
### f. Resist roller

① Remove the rear lower panel.

② Open the clamshell.

③ Remove the power supply unit, then remove the high voltage holder mounting plate AS and the connector.

④ Remove the two screws that hold the paper guide F (1). (Move the paper feed junction holder up or down to gain access to these screws.)

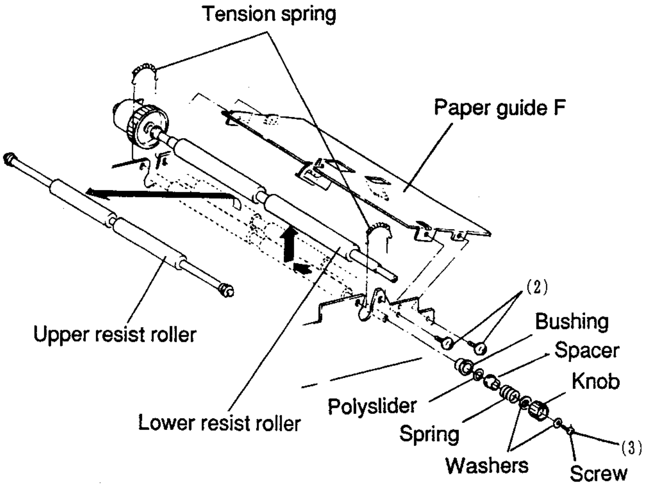

Paper feed junction clutch folder
High voltage holder mounting plate
Connector
(1)
Power supply unit

⑤ Remove the two screws and remove the paper guide F (2).

⑥ Remove the counter-thread screw (3), then remove the knob, washer, spring, spacer, polyslider and bushing.

⑦ Remove the tension spring (one each on front and rear frame sides) and remove the resist roller.

⑧ Move the lower resist roller towards the rear frame side, then in an upward direction to remove it.


Tension spring
Paper guide F
Upper resist roller
(2)
Bushing
Spacer
Knob
Lower resist roller
Polyslider
Spring
Washers
(3)
Screw

## 7. Adjustments

### A. List

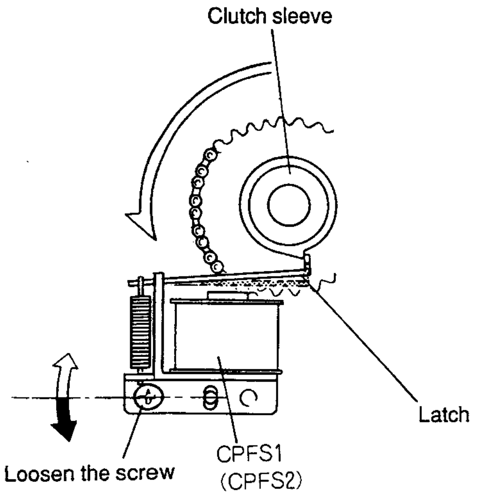
The following items of the paper feed unit require adjustment.

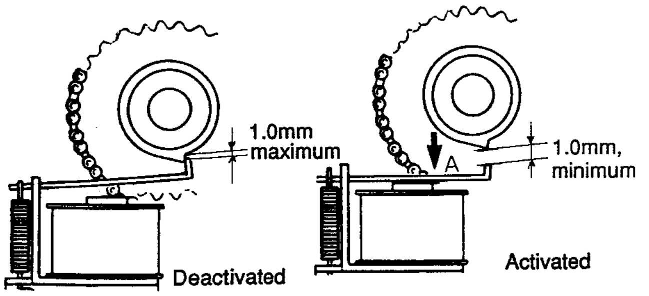
| Item | Description | Refer page |
|---|---|---|
| (1) | Upper and lower cassette paper feed solenoid position adjustment. | 7-11 |
| (2) | Upper and lower cassette paper feed spring clutch clearance adjustment. | 7-11 |
| (3) | Manual feed and lower transport roller solenoid position adjustment. | 7-11 |
| (4) | Manual feed and lower transport roller spring clutch clearance adjustment. | 7-12 |
| (5) | Resist roller clutch clearance adjustment. | 7-12 |
| (6) | Upper and lower transport rollers connection belt tension adjustment | 7-12 |
| (7) | OHP sensor adjustment. | 7-12 |

## B. Adjustment methods

### (1) Upper and lower cassett paper feed solenoid position adjustment (CPFS1, CPFS2)

Loosen the CPFS1 (CPFS2) holding screw, move the solenoid up or down, and adjust it so that the latch and the clutch sleeve should be in position illustrated below.

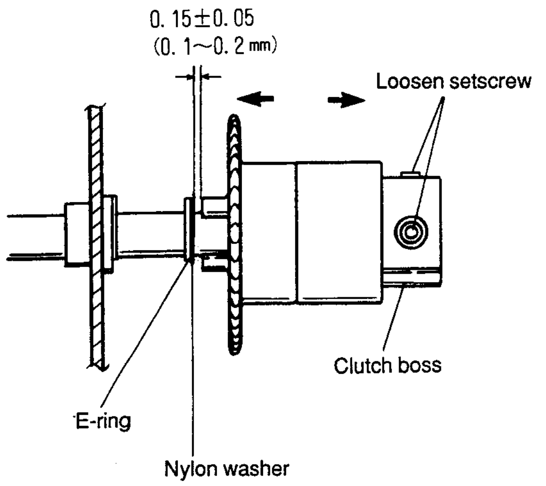

Clutch sleeve
Latch
Loosen the screw
CPFS1
(CPFS2)


1.0mm
maximum
Deactivated
A
1.0mm,
minimum
Activated

Manually move the CPFS1 (CPFS2).
(Press the latch in the arrow direction.)

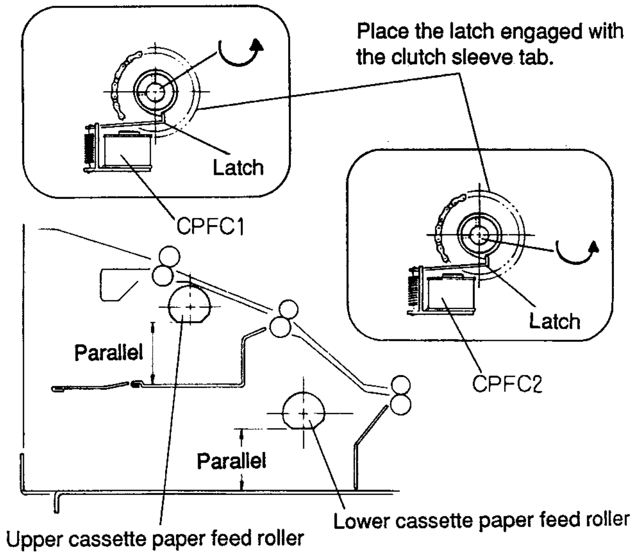
### (2) Upper and lower cassette paper feed spring clutch clearance adjustment (CPFC1, CPFC2)

Loosen the setscrews that hold the clutch boss, move the entire clutch towards the left or right to obtain the clearance shown.


0. 15±0. 05
(0. 1~0. 2 mm)
Loosen setscrew
Clutch boss
E-ring
Nylon washer

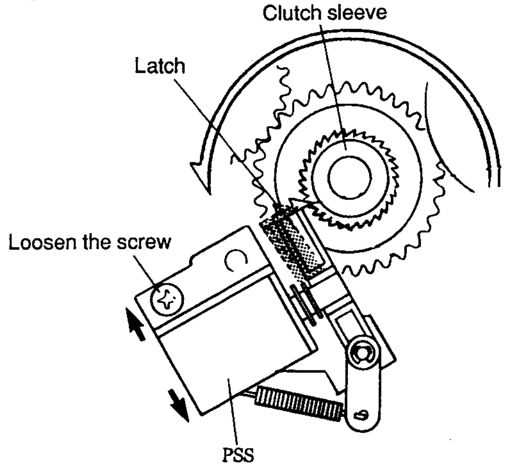
[Clutch boss adjustments]

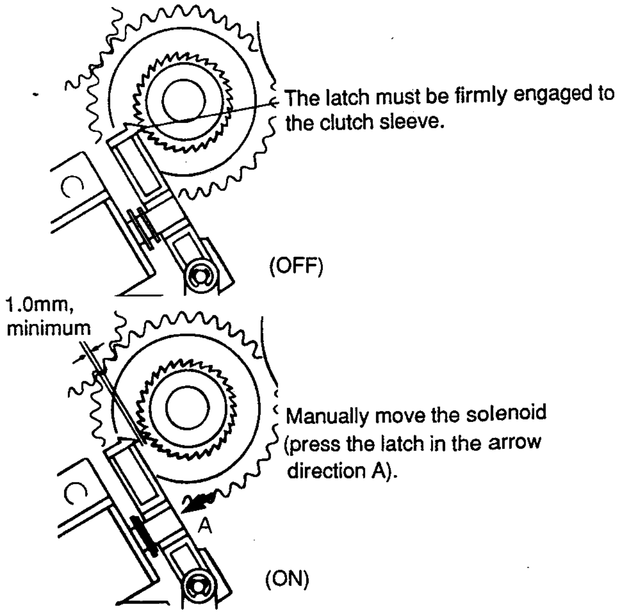
With the latch engaged with the clutch sleeve TAB, turn the paper feed roller shaft counter-clockwise until the flat surface of the roller is parallel to the base plate.


Place the latch engaged with the clutch sleeve tab.
Latch
CPFC1
Parallel
Latch
CPFC2
Parallel
Upper cassette paper feed roller
Lower cassette paper feed roller

### (3) Manual paper feed and lower transport roller solenoid position adjustment (MPFS, TRS)

Loosen the solenoid holding screw, move it in the arrow direction, and adjust it so that the latch and the sleeve are situated as shown in the figure below.


Clutch sleeve
Latch
Loosen the screw
PSS

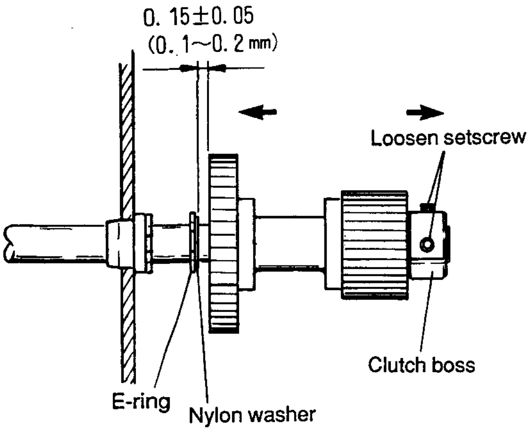

(OFF)
1.0mm,
minimum
A
(ON)

The latch must be firmly engaged to the clutch sleeve.

Manually move the solenoid (press the latch in the arrow direction A).

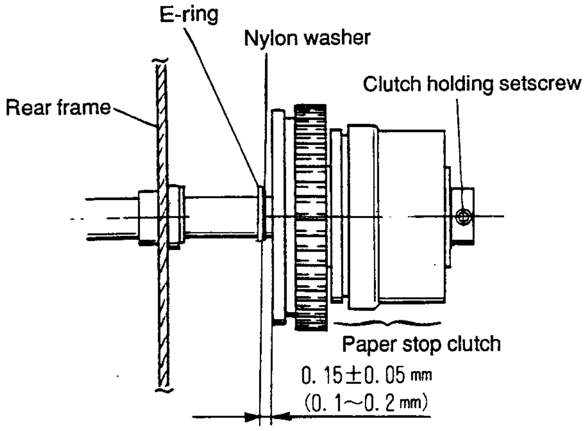
## (4) Manual paper feed and lower transport roller spring clutch clearance adjustment (MPFC, TRC)

Loosen the clutch boss holding setscrews, move the entire clutch left or right to obtan the clearance shown.


0. 15±0. 05
(0. 1~0. 2 mm)
Loosen setscrew
Clutch boss
E-ring
Nylon washer

## (5) Resist roller clutch and transfer roller clutch (TRCC) clearance adjustment (RRC)

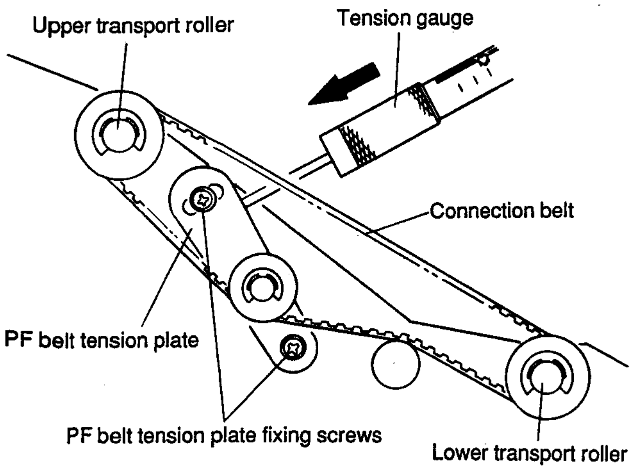
Loosen the clutch holding setscrew, move the clutch unit left or right to obtain the clearance shown.


E-ring
Nylon washer
Clutch holding setscrew
Rear frame
Paper stop clutch
0. 15±0. 05 mm
(0. 1~0. 2 mm)

NOTE: Never lube the magnetic clutch plate with grease.

## (6) Upper and lower transport rollers connection belt tension adjustment

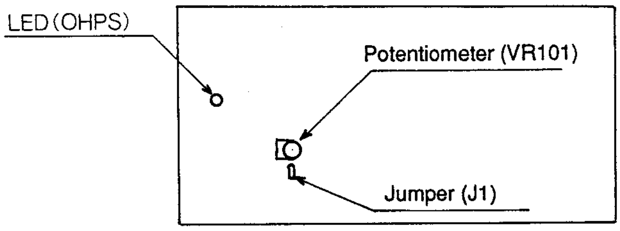
Loosen the two fixing screws of the PF belt tension plate. Apply a tension gauge to the belt tension plate as shown below and tighten the two screws so that the guage shows a tension of 0.2 ~ 0.4kg.


Upper transport roller
Tension gauge
Connection belt
PF belt tension plate
PF belt tension plate fixing screws
Lower transport roller

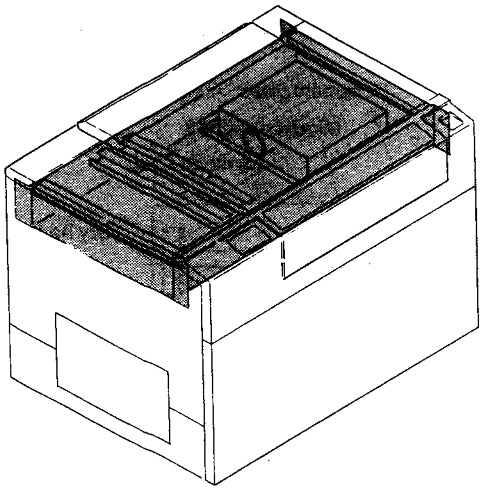
## (7) Transparency sensor (TS) (OHP sensor) level adjustment

When OHP film is loaded in the manual feed tray, presence of the OHP film is detected by the OHP photosensor to set the appropriate fuser speed. The threshold value of the photosensor needs to be adjusted by the potentiometer on the master PWB.

1. With the upper frame locked down (adjustment not possible if opened), turn VR101 fully clockwise. Make sure that the LED (OHPS) is on.
2. Remove the jumper pin (J1) found near the potentiometer and rotate the potentiometer slowly counterclockwise and stop it when the LED (OHPS) just goes out.
3. Connect the jumper pin (J1) which was removed.
4. Adjustment complete.


LED (OHPS)
Potentiometer (VR101)
Jumper (J1)

# [8] OPTICAL SYSTEM



## 1. General

The optical system consists of a zoom lens, four filters, five mirrors, and two copy lamps.

Use of a variable magnification ratio system by means of the zoom lens allows 91 steps of magnification in 1% increments from 64% reduction to 154% enlargement by internally changing the lens to lens distance within the zoom lens, while keeping the distance unchanged between the document and the photoconductor belt.

The slit exposure method with moving light source is adopted for exposure, which keeps the document table stationary.

The filter unit is provided between the document and the lens and is used to separate colors using three types of filters. Red, green, and blue filters are used for full color copying and one neutral density (ND) filter is used for normal black and white and monochrome copying.

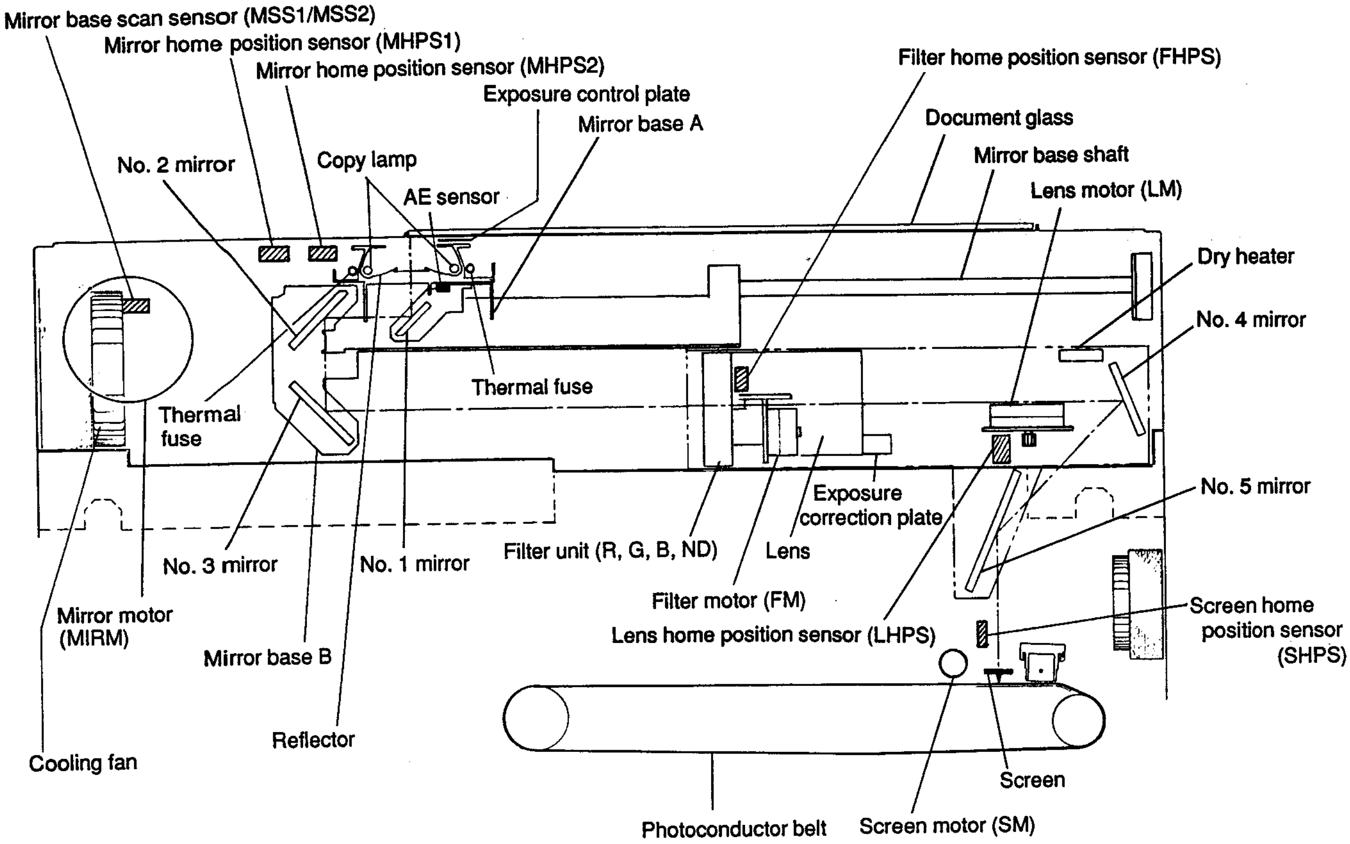
Light intensity is controlled by changing the number of copy lamps and voltage applied. Since a steady voltage is supplied, even exposure is enhanced.

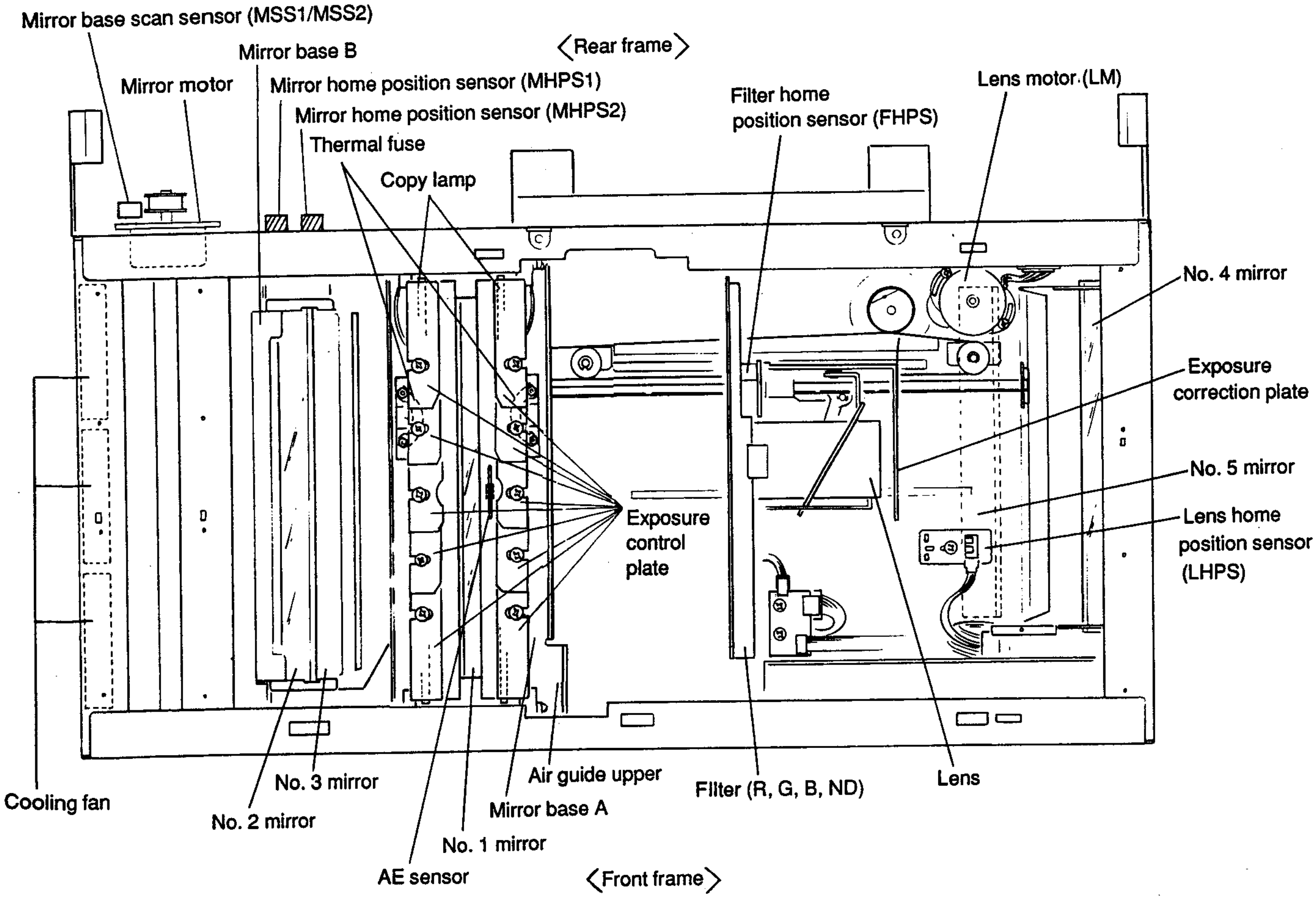
A lens motor (stepping motor) is used to move the lens and a filter motor (stepping motor) is used to select the filters. A mirror motor (DC servo motor) is used for scanning by the mirror base.

## 2. Specifications

- Light source: Halogen lamp (100V system/300W: 2 pcs, 200V system/330W: 2 pcs.)
- Exposure system: Slit exposure with moving light source
- Magnification changing system: By changing lens position and scan speed
- Lens: Zoom lens (F5.6, 2 group: 7 pcs.)
- Filter: R, G, B, ND
- Color separation: Color separation with R, G, B filters

## 3. Construction


Mirror base scan sensor (MSS1/MSS2)
Mirror home position sensor (MHPS1)
Mirror home position sensor (MHPS2)
Exposure control plate
Mirror base A
No. 2 mirror
Copy lamp
AE sensor
Filter home position sensor (FHPS)
Document glass
Mirror base shaft
Lens motor (LM)
Dry heater
No. 4 mirror
Thermal fuse
Thermal fuse
Exposure correction plate
No. 5 mirror
No. 3 mirror
No. 1 mirror
Filter unit (R, G, B, ND)
Lens
Filter motor (FM)
Lens home position sensor (LHPS)
Screen home position sensor (SHPS)
Mirror motor (MIRM)
Mirror base B
Reflector
Cooling fan
Screen
Photoconductor belt
Screen motor (SM)


Mirror base scan sensor (MSS1/MSS2)
Mirror base B
〈Rear frame〉
Mirror motor
Mirror home position sensor (MHPS1)
Mirror home position sensor (MHPS2)
Thermal fuse
Copy lamp
Filter home position sensor (FHPS)
Lens motor (LM)
No. 4 mirror
Exposure correction plate
Exposure control plate
No. 5 mirror
Lens home position sensor (LHPS)
Cooling fan
No. 3 mirror
No. 2 mirror
Air guide upper
Mirror base A
No. 1 mirror
AE sensor
Filter (R, G, B, ND)
Lens
〈Front frame〉

## 4. Major parts and their functions

### (1) Copy lamp unit

Two halogen lamps are used in the copy lamp unit.
The copy lamp drive voltage is controlled in the CLC (Copy Lamp Control) circuit to deliver steady lamp intensity.
One or two lamps activate according to the exposure mode.

100V series: Two halogen lamps of 300W.

200V series: Two halogen lamps of 330W.

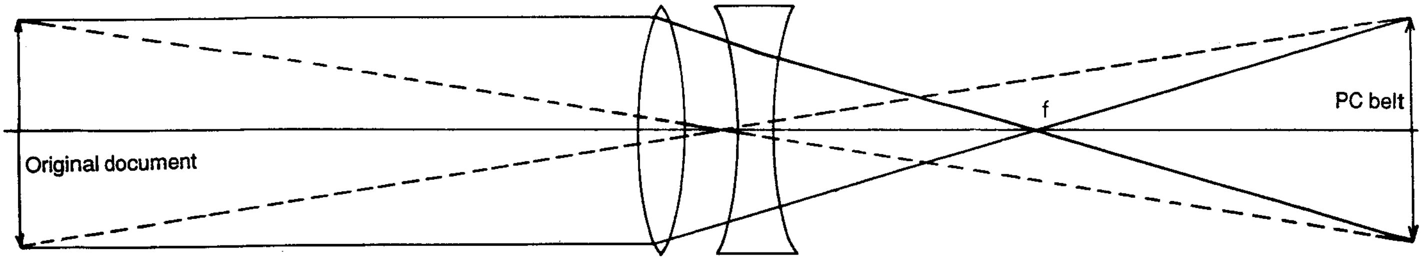
| Copy mode | Exposure mode | No. of lighted lamps |
|---|---|---|
| Full color | Blue | 2 |
| | Green | 1 |
| | Red | 1 |
| Monochrome/Black-White | | 1 |

### (2) Lens

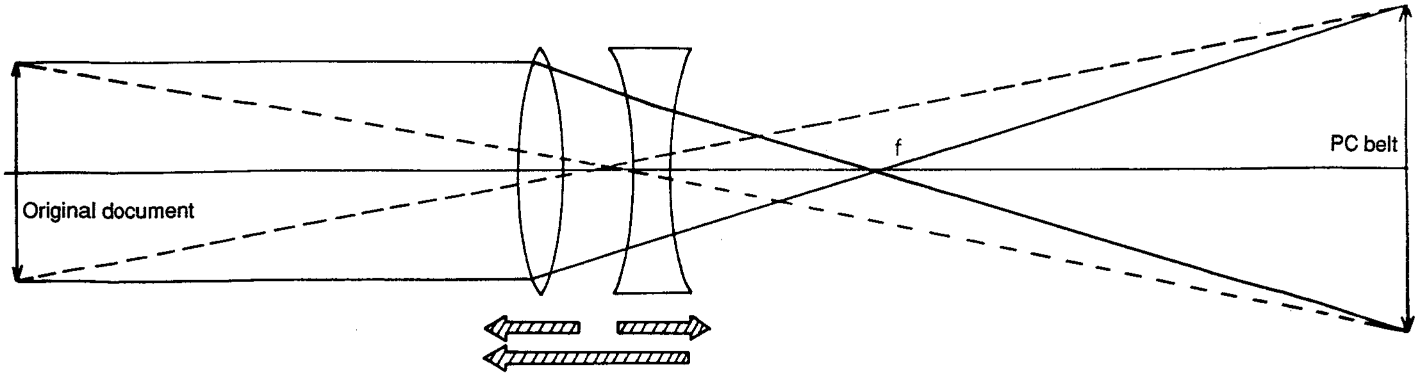
A zoom lens is composed as follows:

- Composition: 2 groups, 7 lenses
- F5.6

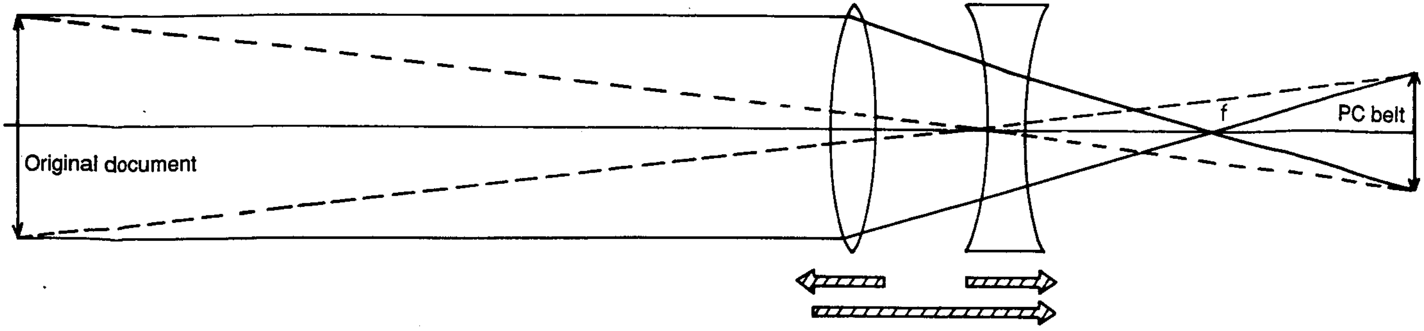
① In the normal mode (1:1): the convex lens to concave lens distance is the shortest, while the lens focal distance is the longest.



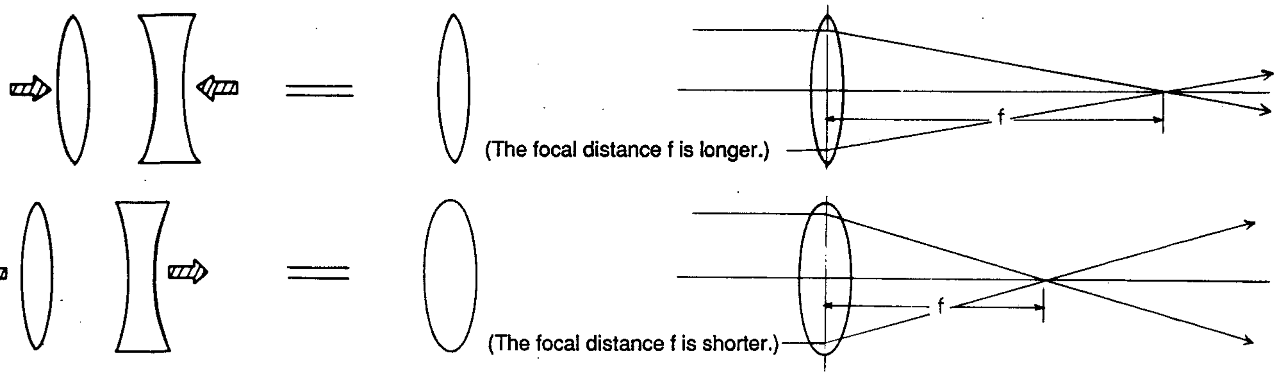
② In the enlarge mode, as compared to the normal mode (1:1): the convex lens to concave lens distance is longer, while the lens focal distance is shorter, and the entire zoom lens situates closer to the original document.



③ In the reduction mode: as compared to the normal mode (1:1): the convex lens to concave lens distance is longer, while the lens focal distance is shorter, and the entire zoom lens situates closer to the PC belt.



Two-group zoom lenses of multi-layer composition are used in this machine. The lenses are roughly grouped into two: one convex lens and one concave lens.
The zoom lens is composed of a convex lens and a concave lens, and its overall characteristics are the same as a convex lens.
The zoom lens focal distance is varied by varying the distance between the convex lens and the concave lens.


(The focal distance f is longer.)
f
(The focal distance f is shorter.)
f

The focal distance becomes shorter when the distance between the convex and concave lenses is longer.
The focal distance becomes longer when the distance between the convex and concave lenses is shorter.
Vertical magnification ratio (in the PC belt axial direction) is changed by varying the position and the focal distance of the zoom lens. Horizontal magnification ratio (in the PC belt rotating direction) is changed by varying the mirror base scan speed (the mirror motor speed).

## (3) Filter unit

R, G, B, and ND filters are used.
Filters R, G, and B are used for color separation and exposure of the three primary colors in full color copy mode.
Filter ND is used for exposure in monochrome and black and white copy modes.

| Copy mode | Exposure mode | Kind of set filter |
|---|---|---|
| Full color | Blue | B filter |
| | Green | G filter |
| | Red | R filter |
| Monochrome/Black-white | | ND filter |

### a. Filter motor (FM)

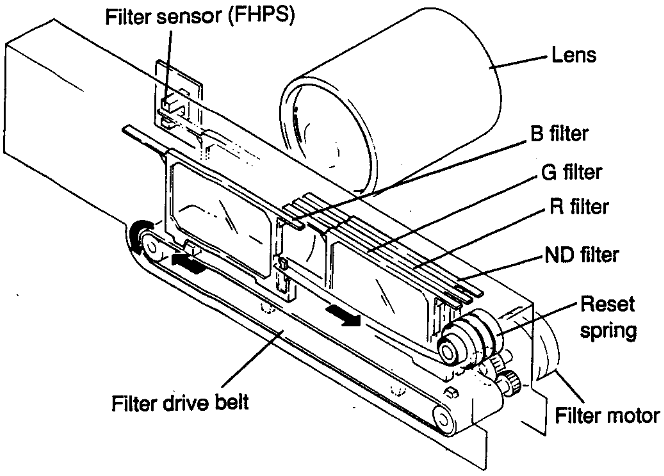
A stepping motor is used to set each filter in the optical path.
It is driven by the slave PWB.

### b. Filter home position sensor (FHPS)

This sensor is a transmission photo sensor used to sense the filter home position.
When the ND filter is set, the output is at a LOW level.
The filter is at home position when ND filter is set.
The sensor output is delivered to the slave PWB.

### c. Filter unit operation

R, G, and B filters are used for full color copying and one neutral density (ND) filter is used for monochrome and black and white copying. The filter corresponding to the exposure mode is positioned by means of the filter motor..



As the filter drive belt rotates in the arrow direction A, the protrusion on the belt seizes the protrusion on the filter to set it into the optical path. As the belt moves further in the direction of arrowhead B, the filter protrusion disengages from the protrusion of the belt so that the filter is reset by means of the reset spring (arrowhead C).
Each filter is set by the protrusion provided to each one in order of ND → B → G → R.
Filter setting is controlled by counting the number of steps (pulses) of the filter motor based on the moment when the filter home position sensor senses the ND filter.

### (4) Mirror

Five mirrors are used.
The No.1 mirror is installed on mirror base A, and the No.2 and No.3 mirrors are on mirror base B.

### (5) Exposure control plate

Ten exposure control plates are installed on the reflector to control exposure balance (uniformity). (For the 200V system, 14 plates are installed.)

Exposure balance (uniformity) can be controlled by changing the installation position of the exposure control plates in the scanning direction to vary the amount of light from the copy lamp and the reflector to the document.

### (6) Exposure correction plate

The exposure correction plate maintains the exposure at a constant level for each copy magnification ratio by interrupting some of the light between the lens and No. 4 mirror.
Its position (interrupted light quantity) varies according to copy magnification ratio (lens position).

### (7) Mirror base A

On the mirror base A are installed the No. 1 mirror, the copy lamps, the reflector, the exposure control plates, the AE sensor, and the temperature fuses.
Mirror base A scans with mirror base B during copy exposure operation.

### (8) Mirror base B

On the mirror base B are installed the No.2 and No.3 mirrors.
Mirror base B scans with mirror base A during copy exposure operation.

### (9) Mirror motor (MIRM)

A DC brushless servo motor is employed to move the mirror bases A and B.
The rpm corresponds to copy magnification ratio.
It is driven by the mirror motor control PWB.

### (10) Lens motor (LM)

A stepping motor is used to move the lens to the proper position corresponding to the magnification ratio. A single pulse will move the lens 0.1mm.
It is driven by the slave PWB.

### (11) Cooling fan motor (CFM)

The cooling fan motor is a DC brushless motor used to expel heat produced by the copy lamp from the machine.

### (12) Mirror home position sensor 1 (MHPS1)

Mirror home position sensor 1 is a transmission photo sensor used to sense the mirror base home position.
When the mirror base is sensed, the output is at Low level. The sensor output is delivered to the main PWB.

### (13) Mirror home position sensor 2 (MHPS2)

Mirror home position sensor 2 is a transmission photo sensor used to sense the mirror base home position.
In returning operation, the brake is applied when this sensor senses the mirror base.
When the mirror base is sensed, the output is at LOW level.
The sensor output is delivered to the main PWB.

### (14) Mirror base scan sensor (MSS1/MSS2)

Mirror base scan sensors are transmission photo sensor used to sense the scanning length, scanning direction, and scanning speed of the mirror base.
The above items are sensed by counting slits of the disk mounted to the mirror motor shaft.
The sensor output is delivered to the main PWB.

### (15) Lens home position sensor (LHPS)

This sensor is a transmission photo sensor used to sense the lens home position.
Lens home position (lens position at magnification ratio of 100%) is obtained by sensing lens position at the magnification ratio 64% position.
When the lens is sensed (i. e., the lens is at position when copy magnification ratio is 64%), the output is at HIGH level.
The sensor output is delivered to the slave PWB.

### (16) AE sensor (scanning length)

This sensor is used to sense the exposure of the document.
A photo diode is used as its element. Document density is obtained from the quantity of reflected light from the document.
The sensing area is 120mm wide at the center of the document in the scanning direction.
The sensor output is delivered to the slave PWB.

### (17) Thermal fuse

To prevent an irregular temperature rise in the optical system, a thermal fuse is attached to each lamp reflector which is employed to directly shut down the copy lamp drive power when the temperature rises above 91°C.

### (18) Mirror motor control PWB

This PWB is used to control the mirror motor speed.

### (19) Screen unit

The screen unit is set over the exposure area of the photoconductor belt in the photo copy mode.
The screen is made of a mylar sheet with thin black lines on it.
The thin shades formed by the screen lowers the exposure level to improve the color balance and gradation in the low density areas.

#### a. Screen

The screen is made of a mylar film sheet.

#### b. Screen motor

The screen motor sets and resets the screen.
It is controlled by the slave PWB. A stepping motor is used.

#### c. Screen home position sensor (SHPS)

This sensor senses that the screen is at the reset position.

A photo transmission sensor is used.

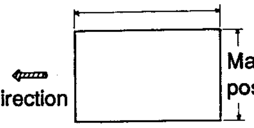
When the screen is at the reset position, the sensor output is at HIGH level. The sensor output is passed to the slave PWB.

# 5. Operational description

## A. Changing magnification ratio

### (1) Vertical magnification ratio and horizontal magnification ratio

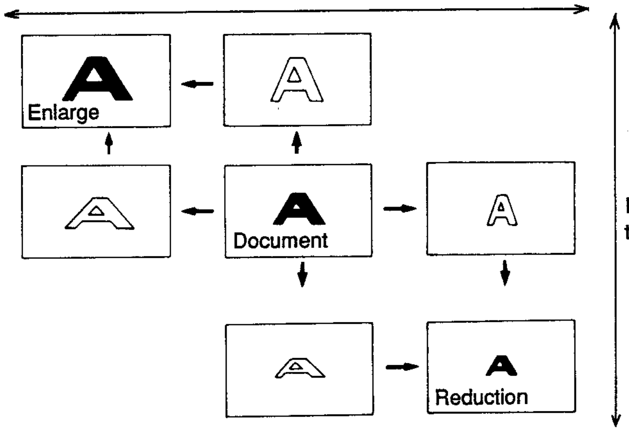
Magnification ratio of copy in the PC belt axial direction is varied by changing the zoom lens position and focal distance. For the PC belt rotating direction, ratio is varied by changing the mirror base scanning speed (mirror motor revolutions).



Magnification ratio is varied by changing the mirror base moving speed (mirror motor rotations).

Magnification ratio is varied by changing the zoom lens position and focal distance.

Copy paper exit direction



Magnification ratio is varied by changing the mirror moving speed.
(Mirror moving speed < Photoconductor belt speed < mirror moving speed)

Magnification ratio is varied by changing the zoom lens position and the focal distance.

# 6. Major parts disassembly, assembly, replacement, cleaning

## A. List of major parts

| Item No. | | Part name | | | When replacement required | When cleaning required | Ref. page |
|---|---|---|---|---|---|---|---|
| (1) | | Mirror base A unit | | | | | 8-8 |
| | a | Thermal fuse | | | | | 8-8 |
| | b | Copy lamp, | Main | 100V series | | At maintenance (every 20K scan) | 8-8 |
| | | | | 200V series | | At maintenance (every 20K scan) | |
| | | | Sub | 100V series | | At maintenance (every 20K scan) | |
| | | | | 200V series | | At maintenance (every 20K scan) | |
| | | Reflector | Main | | | At maintenance (every 20K scan) | |
| | | | Sub | | | At maintenance (every 20K scan) | |
| | c | AE sensor | | | | At maintenance (every 20K scan) | 8-9 |
| | d | CL lead harness (cable) | | 100V series | At maintenance (every 120K scan) | | 8-9 |
| | | | | 200V series | At maintenance (every 120K scan) | | |
| | e | No. 1 mirror | | | | At maintenance (every 20K scan) | 8-10 |
| (2) | | Mirror base B unit | | | | | 8-11 |
| | a | No. 2 mirror | | | | At maintenance (every 20K scan) | 8-11 |
| | b | No. 3 mirror | | | | At maintenance (every 20K scan) | 8-11 |
| (3) | | No. 4 mirror | | | | At maintenance (every 20K scan) | 8-11 |
| (4) | | No. 5 mirror | | | | At maintenance (every 20K scan) | 8-11 |
| (5) | | Mirror base drive wire | | | | | 8-12 |
| (6) | | Lens unit | | | | | 8-14 |
| | a | Lens | | | | At maintenance (every 20K scan) | 8-15 |
| | b | Lens slide base | | | | | 8-15 |
| | c | Lens motor | | | | | 8-16 |
| | d | Lens drive wire | | | | | 8-16 |
| | e | Exposure correction plate | | | | | 8-17 |
| (7) | | Filter unit | | | | | 8-17 |
| | a | Filter | R | | | At maintenance (every 20K scan) | 8-18 |
| | | | G | | | At maintenance (every 20K scan) | |
| | | | B | | | At maintenance (every 20K scan) | |
| | | | ND | | | At maintenance (every 20K scan) | |
| | b | Filter drive belt | | | | | 8-18 |
| | c | Filter home position sensor | | | | | 8-19 |
| (8) | | Screen | | | | At every maintenance (every 20K scan) | 8-19 |

## B. Procedures

### (1) Mirror base A unit

#### a. Thermal fuse replacement

I. Tools requird for adjustment

- Plus screwdriver
- Wrench

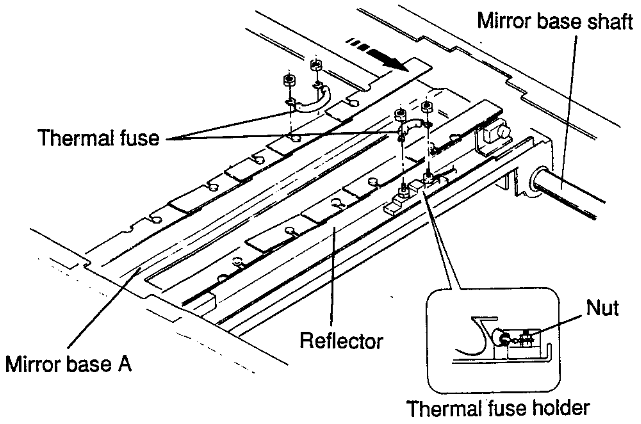
II. Replacement procedures

① Remove the document glass.

② Locate the mirror base A to the paper feed side.

Hint: Pull the mirror base shaft side to remove as shown by arrow.

③ Remove the nut that holds the thermal fuse; one each on both sides.


Mirror base shaft
Thermal fuse
Nut
Reflector
Mirror base A
Thermal fuse holder

④ Remove the thermal fuse.

(Note) Make sure that the thermal fuse is firmly engaged between the reflector and the thermal fuse holding bracket and that the fuse is in close contact with the reflector.

#### b. Copy lamp cleaning/replacement, reflector cleaning

I. Tools required for adjustment

- Neutral cleanser
- Water
- Waste cloth

II. Note

- When cleaning, do not put or spill water on the conductive area.
- When replacing or cleaning the copy lamp, or cleaning the reflector, the uniformity adjustment (Refer to page 8-31) and the copy quality adjustment (Refer to page 4-1) must be made.

III. Replacement procedure

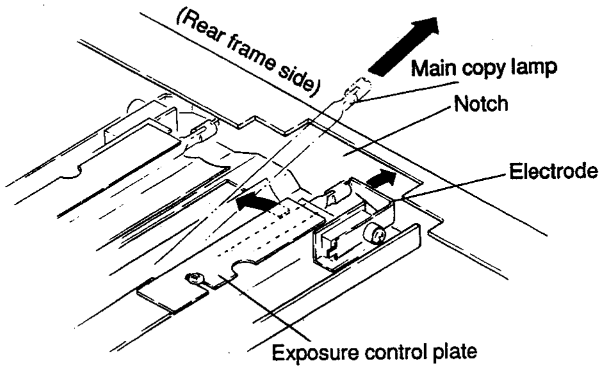
Copy lamp removal

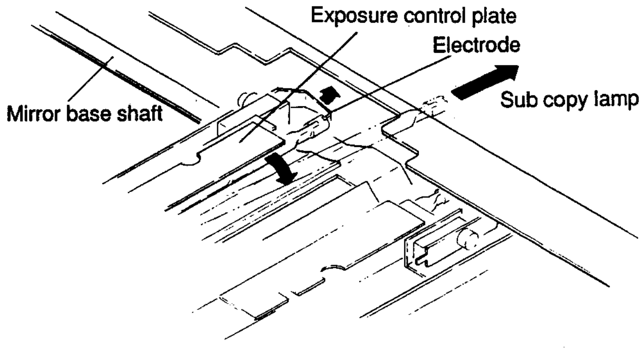
① Remove the document table glass.

② Manually move the mirror base A over the notches on both sides of frames.

(Note) Pull the mirror base shaft side of the mirror base A to move it.

③ With a pair of tweezers, push the copy lamp electrode on the rear frame side in the arrow direction to remove the copy lamp.


(Rear frame side)
Main copy lamp
Notch
Electrode
Exposure control plate

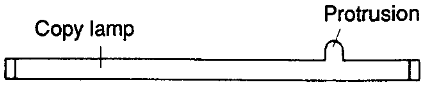

Exposure control plate
Electrode
Mirror base shaft
Sub copy lamp

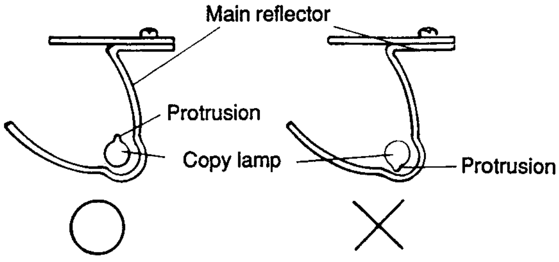
Copy lamp installing procedure

(Note) Note the installing direction of the copy lamp as follows:

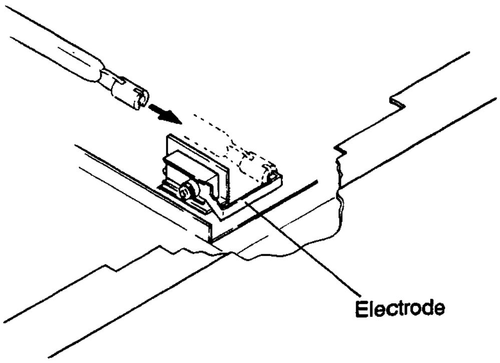
(Main copy lamp)
Set the protrusion side of the copy lamp so that the protrusion faces upwards.

(Sub copy lamp)
Set the protrusion side of the copy lamp so that the protrusion faces upwards.


Copy lamp
Protrusion


Main reflector
Protrusion
Copy lamp
Protrusion
○
×

- Make sure that the electrode is firmly engaged in the copy lamp socket.



Copy lamp/reflector cleaning

Clean the copy lamp and the reflector with neutral cleanser and water, then wipe with dry waste cloth.

### c. AE sensor replacement/cleaning

I. Tools required for adjustment

- Water
- Waste cloth

II. Note

- After replacement or cleaning of the AE sensor, auto copy mode copy quality adjustment must be made.

III. Problems caused by improper procedure

Document density detection failure

↓

Defective copy quality (improper copy density) in the auto copy mode

IV. Replacement/cleaning procedure

AE sensor removal

① Remove the table glass.

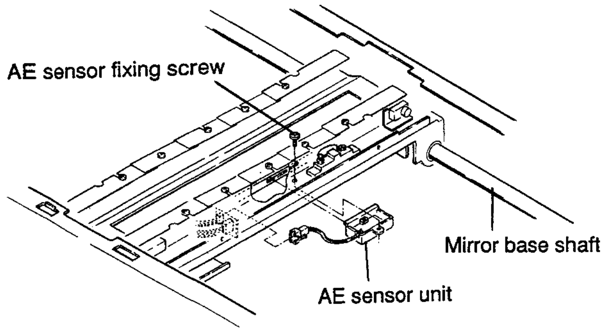
② Move the mirror base A towards the paper entry side.

(Note) Hold the mirror base shaft side of the mirror base A to move it.

③ Remove the upper air guide of the mirror base A.

④ Remove the screw that secures the AE sensor.

⑤ Disconnect the connector and remove the AE sensor assy.


AE sensor fixing screw
Mirror base shaft
AE sensor unit

Cleaning procedure

Wipe the AE sensor with clean cloth dampened with alcohol or water.

(Note) Never use dry cloth to wipe the AE sensor because it may generate static electricity on the sensor, attracting dust.

(Dust on the AE sensor may affect the document density measurement, causing insufficient copying in the auto copy mode.)

### d. CL (copy lamp) cable replacement

I. The following items are required:

- Plus screwdriver

II. Problems caused by improper procedure
Interferance with mirror base scan.

III. Replacement procedure

CL cable removal

The CL cable flexes with every scan. It must be replaced at every 120K scan.

① Remove the document table glass.

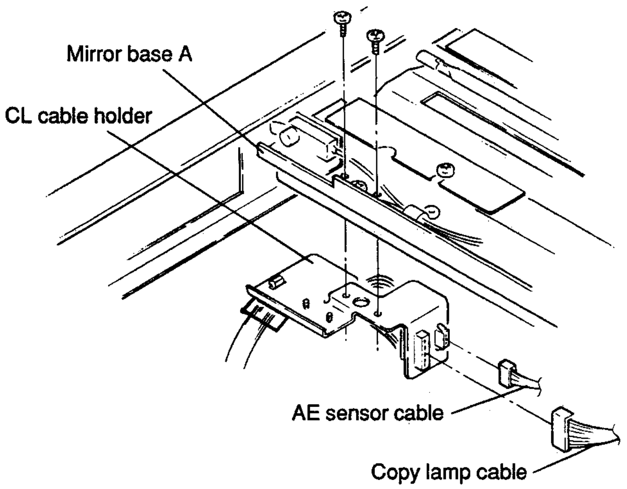
② Move the mirror base A towards the paper exit side.

(Note) Hold the mirror shaft side of the mirror base A to move it.

③ Move the mirror base A towards the paper entry side.

④ Remove the CL cable holder from mirror base A.

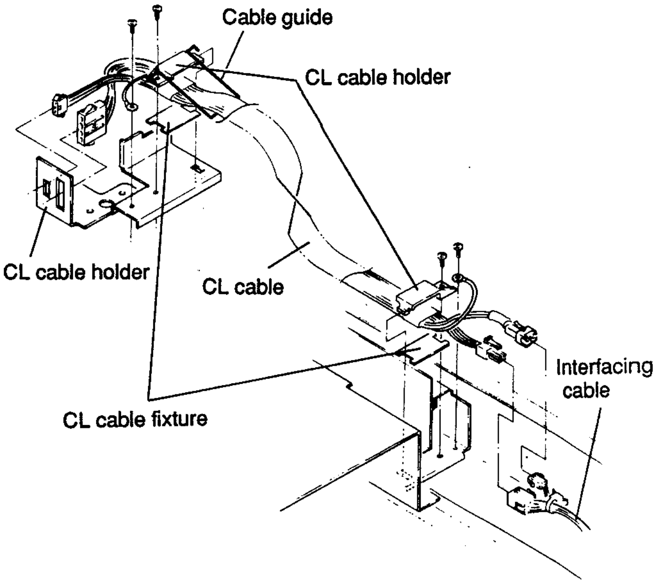
⑤ Remove the CL cable connector and the AE sensor connector from the CL cable holder.


Mirror base A
CL cable holder
AE sensor cable
Copy lamp cable

⑥ Move mirror base A to the paper exit side.

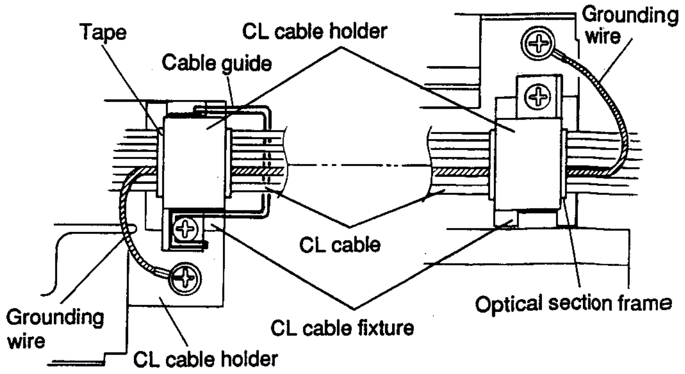
⑦ Disconnect the two CL cable connectors inside the front frame from the interface cable.

⑧ Remove the four CL cable holder fixing screws, and remove the CL cable.


Cable guide
CL cable holder
CL cable holder
CL cable
Interfacing cable
CL cable fixture

CL cable attachment

- Insert the vinyl taped portion of the copy lamp cable (see the figure) between the copy lamp cable holder and the copy lamp cable holding table, then secure it.
- Note the installing direction of the copy lamp cable.


Tape
CL cable holder
Cable guide
Grounding wire
CL cable
Optical section frame
Grounding wire
CL cable fixture
CL cable holder

<Mirror base A side>
(Bottom view)

<Upper frame side>
(Top view)

- Adjust so that the CL cable smoothly moves when the mirror base is manually scanned.

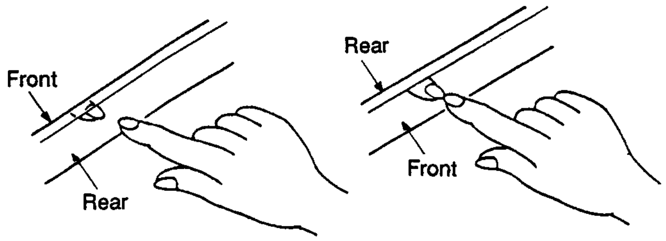
### e. No. 1 mirror replacement/cleaning

I. Tools required for adjustment

- Plus screwdriver
- Cloth
- Minus screwdriver (small one)

II. Note

- Be sure to check the front and rear surfaces of the mirror. Install the mirrors so that light reflects on the front surface.



- When an object (finger) is made contact with the mirror front surface, the real image will be in close contact with the virtual image.
- When an object (finger) is made contact with the mirror rear surface, there will be a distance between the real image and the virtual image.
- If the front and rear surfaces of the mirror are mistaken, troubles such as improper focusing, copy magnification ratio trouble, overlapped copying may occur.
- For cleaning, use dry cloth. Do not rub too strongly. (Use of alcohol may produce blurs.)
- Be careful not to scratch the mirror.
- Do not touch the mirror positioning screw. The mirror position screw which determines the mirror angle cannot be adjusted in the field.
- When installing the mirror, be sure to install the mirror fastener to the notched section of the mirror holder.
- After removing any one of the mirrors, the following adjustments must be made.

  ☆ Image distortion adjustment

  ☆ Focus adjustment

  ☆ Copy magnification ratio adjustment

  ☆ Image center position adjustment

  ☆ Image loss/void area adjustment

III. Problems caused by improper procedure

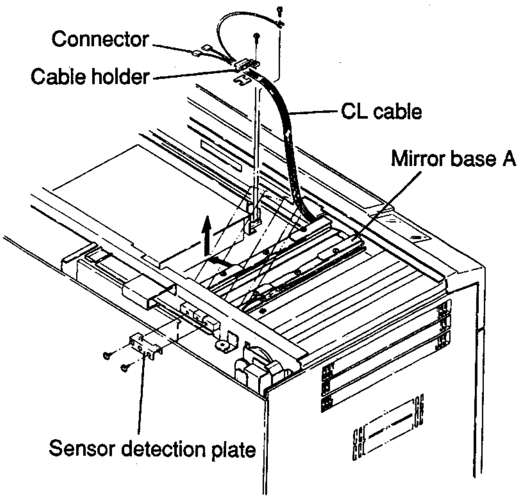
Copy image distortion
↓
Improper copy focusing

IV. Replacement/cleaning procedures

**Removing No.1 mirror**

① Remove the table glass, the rear upper exterior, the right upper exterior, the left upper exterior, and the right side exterior.

② Remove the sensor detection plate attached to mirror base A.

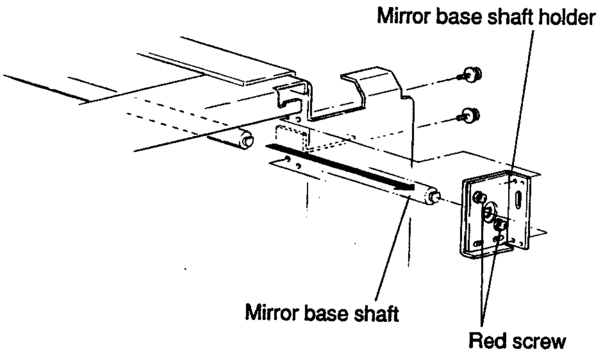


③ Remove the CL cable connector and the cable holder.

④ Remove the mirror base drive wire. (See page 8-12)

⑤ Remove the mirror base shaft holder in the paper feed side.

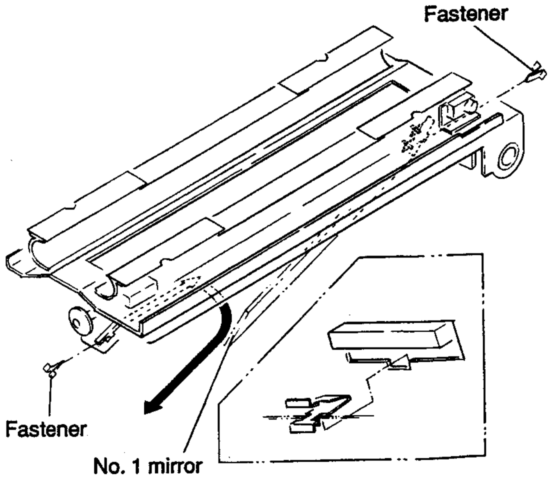
(Note) Do not remove the red screw of the mirror base shaft holder. The red screw is to determine the scanning direction and horizontal parallelism of the mirror base, which cannot be adjusted in the field.



⑥ Remove the mirror base shaft.

⑦ Remove mirror base A.

⑧ Remove the fastener and remove the No. 1 mirror from mirror base A.



Cleaning procedure

For cleaning, use dry cloth.

(Note) No need to disassemble mirror base A unit for cleaning.

## (2) Mirror base B unit

### a. No.2 mirror replacement/cleaning

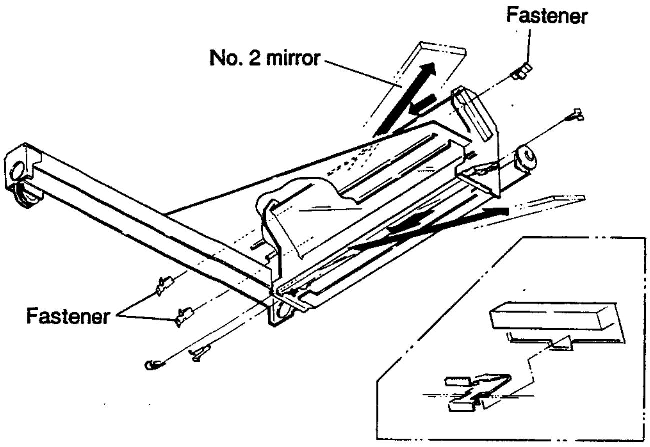
For "Tools required for adjustment," "Note," and "Problems caused by improper procedure," refer to "No.1 mirror replacement/cleaning".

I. Replacement/cleaning procedures

Removing the No. 2 mirror

① Remove the document glass.

② Remove the fastener and remove the No. 2 mirror from mirror base B.



Cleaning procedure

For cleaning, use dry cloth.

### b. No.3 mirror replacement/cleaning

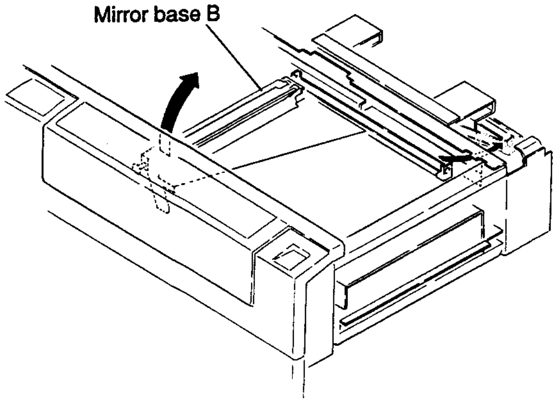
For "Tools required for adjustment," "Note," and "Problems caused by improper procedure," refer to "No.1 mirror replacement/cleaning".

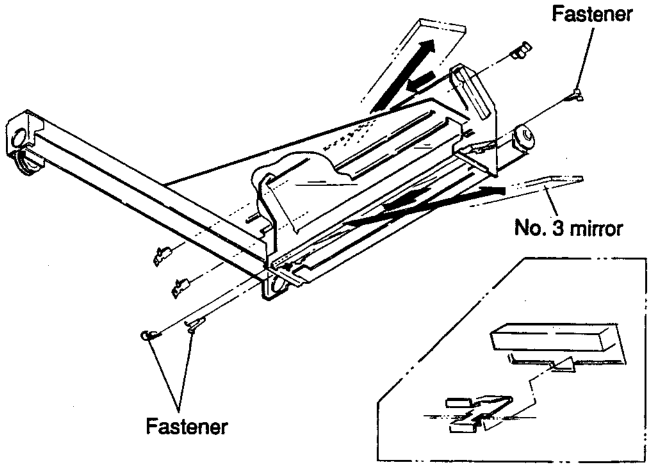
Removing the No. 3 mirror

① Remove mirror base A. (Refer to "Removing the No. 1 mirror" procedures ① to ⑦.)

② Remove mirror base B.

③ Remove the fastener and remove the No. 3 mirror from mirror base B.





Cleaning procedure

For cleaning, use dry cloth.

## (3) No.4 mirror replacement/cleaning

For "Tools required for adjustment," "Note," and "Problems caused by improper procedure," refer to "No.1 mirror replacement/cleaning" (page 8-10).

I. Replacement/cleaning procedure

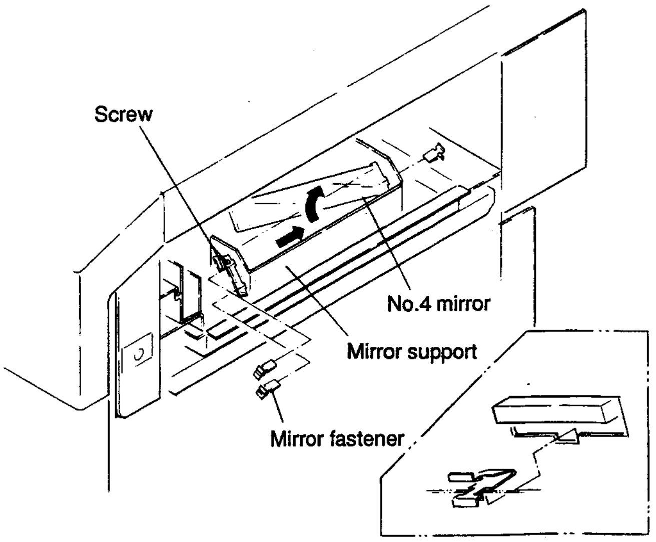
Removing the No. 4 mirror

① Remove the document glass.

② Remove the lens unit cover. (See page 8-14)

③ Remove the right side exterior.

④ Remove the fastener and remove the No. 4 mirror from the lens base unit.



Cleaning procedure

For cleaning, use dry cloth.

## (4) No.5 mirror replacement/cleaning

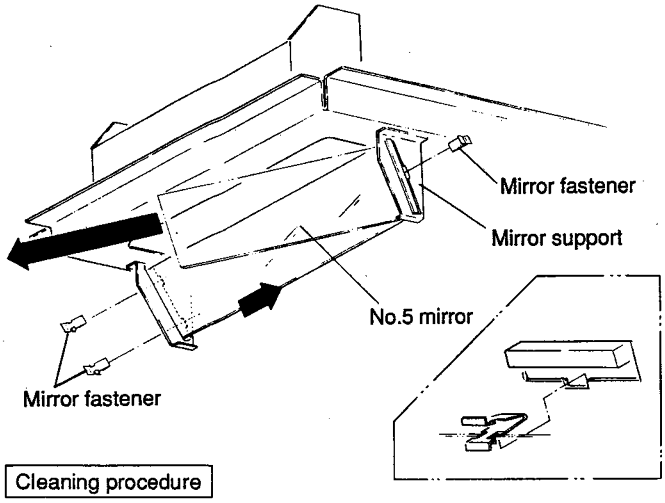
For "Tools required for adjustment," "Note," and "Problems caused by improper procedure," refer to "No.1 mirror replacement/cleaning".

I. Replacement/cleaning procedure

Removing the No. 5 mirror

① Remove the lens base unit. (See page 8-14)

② Remove the fastener and remove the No. 5 mirror from the lens base unit.


Mirror fastener
Mirror support
No.5 mirror
Mirror fastener

Cleaning procedure

For cleaning, use dry cloth.

## (5) Mirror base drive wire replacement

I. Tools required for adjustment

- Plus screwdriver
- Scale
- Pliers

II. Note

- After replacement or reassembly of the mirror base drive wire, the following adjustments must be made.

① Focus adjustment (See page 8-21.)

② Copy image reference position adjustment (See page 8-26)

③ Copy image lead edge void area/image loss adjustment (Se page 8-28)

III. Problems caused by improper procedure

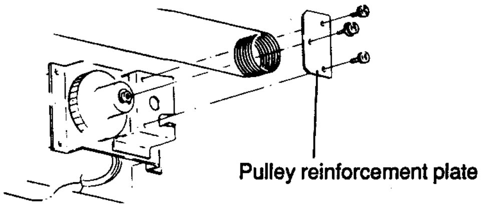
- The mirror base drive system is locked.
  ↓
  L1 and L3 troubles occur.
- Interferance with mirror base scan.

IV. Replacement procedure

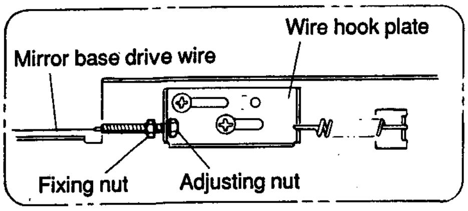
Mirror base drive wire removal

① Remove the rear upper exterior.

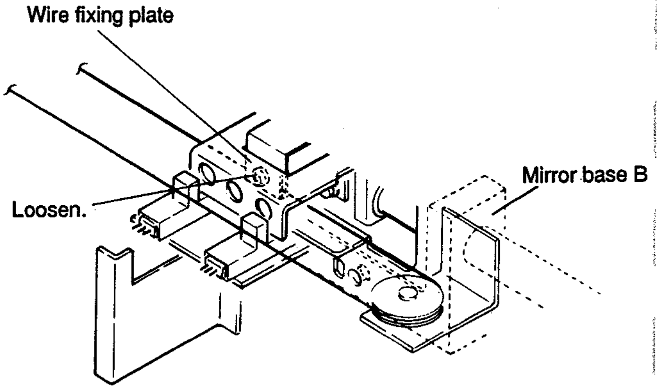
② Remove the pulley reinforcing plate.


Pulley reinforcement plate

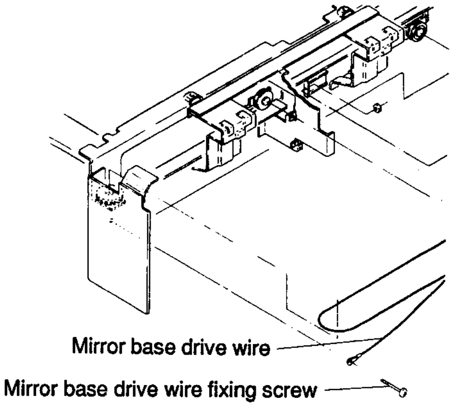
③ Remove the mirror base drive wire tension adjusting nut.


Wire hook plate
Mirror base drive wire
Fixing nut
Adjusting nut

④ Loosen the wire fixing screw on mirror base B, and remove the mirror base drive wire from mirror base A.


Wire fixing plate
Mirror base B
Loosen.

⑤ Remove the mirror base drive wire fixing screw and remove the mirror base drive wire.


Mirror base drive wire
Mirror base drive wire fixing screw

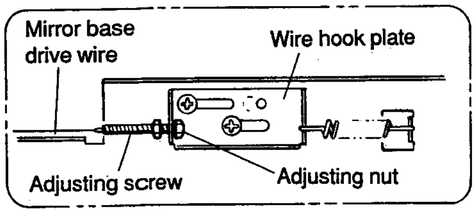
## Stretching the mirror base drive wire

① Move the mirror base towards the paper exit side.

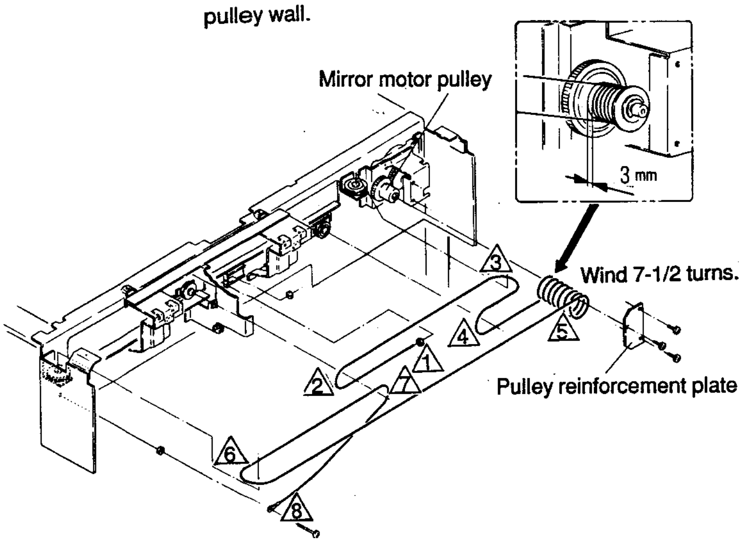
② Remove the PWB holder with slave PWB, and the copy lamp control PWB.

③ Temporarily fasten the end of the mirror base drive wire of the tension adjusting screw side to the wire hook plate using the nut.

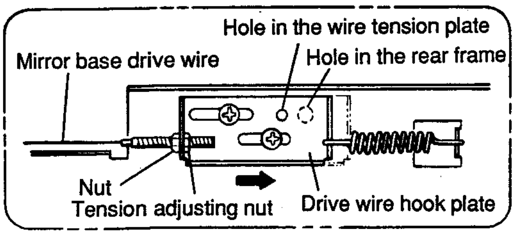
NOTE: The wire must be temporarily fastened at the lead edge.


Mirror base drive wire
Wire hook plate
Adjusting screw
Adjusting nut

④ Stretch the mirror wire in sequence of △1 to △8.


Wind the drive wire with a clearance of 3mm from the pulley wall.

Mirror motor pulley
3 mm
Wind 7-1/2 turns.
Pulley reinforcement plate
1
2
3
4
5
6
7
8


Hole in the wire tension plate
Mirror base drive wire
Hole in the rear frame
Nut
Tension adjusting nut
Drive wire hook plate

⑤ Replace the pulley reinforcing plate.

⑥ Push the wire hook adjust plate a several times in arrow direction A with a strong force.

⑦ Adjust to match the hole in the drive wire hook plate with the hole in the rear frame using the tension adjusting nut.

⑧ Manually turn mirror base B 2 or 3 turns and check that the wire hook plate fits with the frame hole.

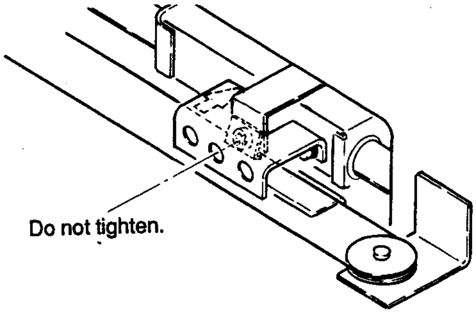
⑨ Secure with the fixing nut.
If the wire hook hole does not match with the rear frame hole, repeat procedures ⑦ and ⑧.

## Mirror base fixing

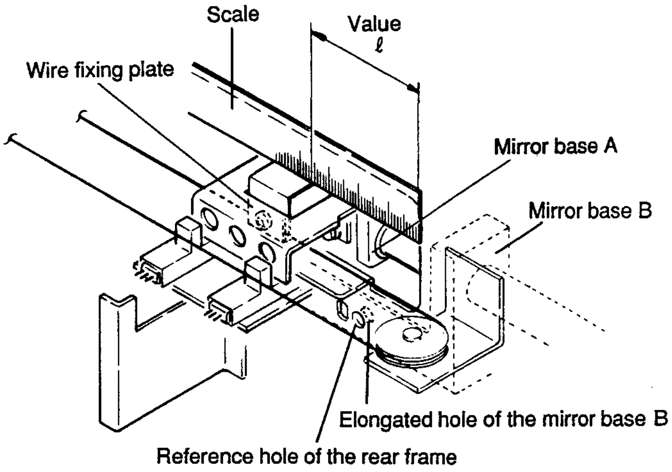
For fixing the mirror base, mirror base A must be temporarily fixed to mirror base drive wire. It will be firmly fixed after focus adjustment.

① Pass the mirror base drive wire through the wire fixing section of mirror base A.

(Note) Do not tighten the wire fixing screw of mirror base A. (Mirror base A must not be fixed to the base drive wire.)


Do not tighten.

② Manually move mirror base B to fit the long hole in mirror base B with the round reference hole in the rear frame.


Scale
Value ℓ
Wire fixing plate
Mirror base A
Mirror base B
Elongated hole of the mirror base B
Reference hole of the rear frame

③ Check the I/O display label indication on the lens to obtain value ℓ. (See the table below.)

<I/O value displayed on the lens unit and value ℓ>

| I/O value | "ℓ" value | I/O display label indication | I/O value | "ℓ" value | I/O display label indication |
|---|---|---|---|---|---|
| 0 ~ +0.4 | 34 | A34 | –0.1 ~ –0.5 | 33.5 | B33 |
| +0.5 ~ +0.9 | 34.5 | B34 | –0.6 ~ –1.0 | 33 | A33 |
| +1.0 ~ +1.4 | 35 | A35 | –1.1 ~ –1.5 | 32.5 | B32 |
| +1.5 ~ +1.9 | 35.5 | B35 | –1.6 ~ –2.0 | 32 | A32 |
| +2.0 ~ +2.4 | 36 | A36 | –2.1 ~ –2.5 | 31.5 | B31 |
| +2.5 ~ +2.9 | 36.5 | B36 | –2.6 ~ –3.0 | 31 | A31 |
| +3.0 ~ +3.4 | 37 | A37 | –3.1 ~ –3.5 | 30.5 | B30 |
| +3.5 ~ +3.9 | 37.5 | B37 | –3.6 ~ –4.7 | 30 | A30 |
| +4.0 ~ +4.4 | 38 | A38 | –4.1 ~ –4.5 | 29.5 | B29 |
| +4.5 ~ +4.9 | 38.5 | B38 | –4.6 ~ –5.0 | 29 | A29 |
| +5.0 ~ +5.4 | 39 | A39 | –5.1 ~ –5.5 | 28.5 | B28 |
| +5.5 ~ +5.9 | 39.5 | B39 | –5.6 ~ –6.0 | 28 | A28 |
| +6.0 ~ +6.4 | 40 | A40 | –6.1 ~ –6.5 | 27.5 | B27 |
| +6.5 ~ +6.9 | 40.5 | B40 | –6.6 ~ –7.0 | 27 | A27 |
| +7.0 ~ +7.4 | 41 | A41 | –7.1 ~ –7.5 | 26.5 | B26 |
| +7.5 ~ +7.9 | 41.5 | B41 | –7.6 ~ –8.0 | 26 | A26 |
| +8.0 ~ +8.4 | 42 | A42 | –8.1 ~ –8.5 | 25.5 | B25 |
| +9.5 ~ +8.9 | 42.5 | B42 | –8.6 ~ –9.0 | 25 | A25 |
| +9.0 ~ +9.4 | 43 | A43 | –9.1 ~ –9.5 | 24.5 | B24 |
| +9.5 ~ +10.0 | 43.5 | B43 | –9.6 ~ –10.0 | 24 | A24 |

④ Put a scale as shown in the figure in ② and adjust mirror base A position without moving mirror base B so that the value becomes ℓ.

⑤ Secure the wire fixing screw to fix the mirror base drive wire to mirror base A.

⑥ Make a copy to check.

⑦ If focus is improper, perform fine adjustment. (Refer to 8-20 Focus adjustment.)

## (6) Lens unit

Lens unit removal

① Remove the document glass.

② Remove the AE sensor cable and the CL cable from the CL cable guide.

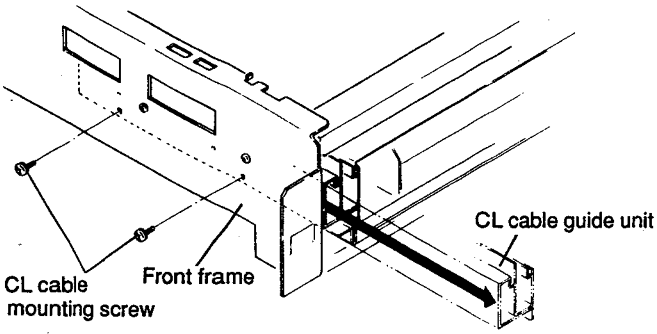
③ Remove the rear exterior.

④ Remove the right rear exterior.

⑤ Remove the rear upper exterior.

⑥ Remove the right upper exterior.

⑦ Open the operation exterior, remove two screws and pull out the CL cable guide.


CL cable guide unit
CL cable mounting screw
Front frame

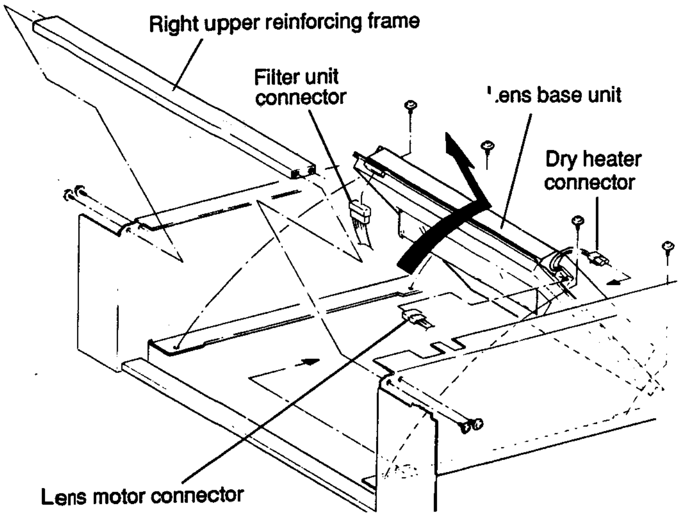
⑨ Remove the connectors of the filter unit, lens motor, and dry heater.

⑩ Remove the right upper reinforcing frame.

⑪ Slide the mirror base to the paper exit side.

⑫ Remove the four fixing screws of the lens base unit, and remove the lens unit in the arrow direction.

(Note) be careful not to scratch the No. 5 mirror.


Right upper reinforcing frame
Filter unit connector
Lens base unit
Dry heater connector
Lens motor connector

### d. Lens replacement/cleaning

I. Tools required for adjustment

- Plus screwdriver
- Waste cloth

II. Note

- For cleaning, use dry cloth. Do not wipe too strongly. Do not use alcohol for cleaning because it may blur the lens.
- Be careful not to scratch the lens.
- After replacement of the lens, the following adjustments must be made.

① Focus adjustment

② Copy magnification ratio adjustment

III. Problem caused by improper procedure

- Improper copy focusing

IV. Replacement/cleaning procedures

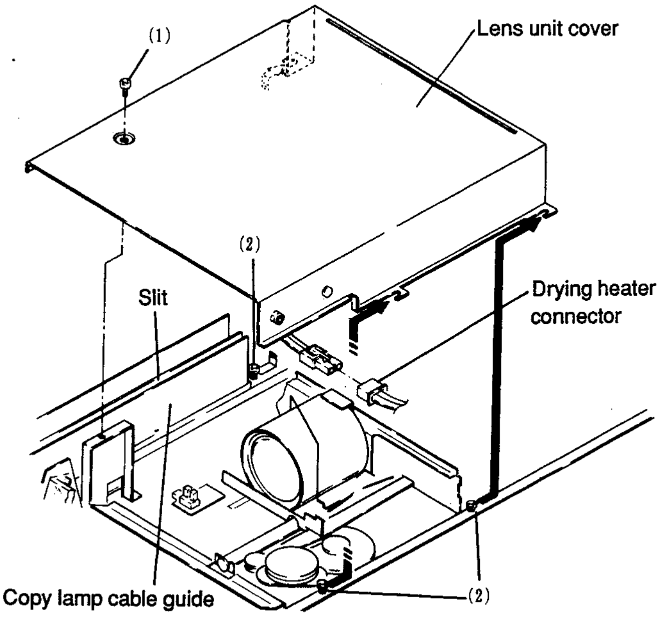
Lens removal

① Remove the table glass.

② Remove the lower air guide.

③ Remove screw (1) and loosen three screws (2).

④ Disconnect the drying heater cable connector and remove the lens unit cover.

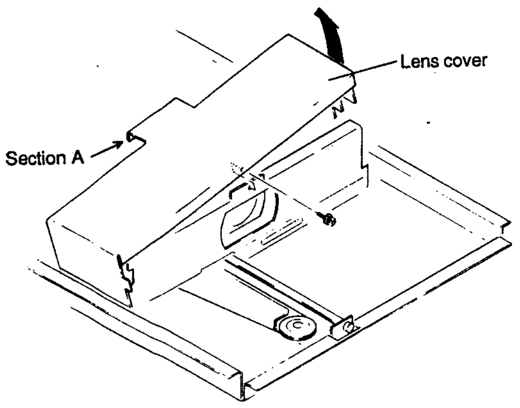

(1)
Lens unit cover
(2)
Slit
Drying heater connector
Copy lamp cable guide
(2)

[Note for lens unit cover installation]
The lens cover unit must be inserted in the slit of the copy lamp cable guide.

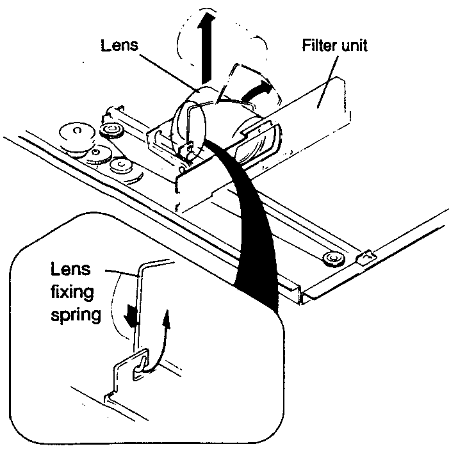
⑤ Remove the lens cover.

[Note for lens cover installation]

- As shown in the figure below, install so that section A presses the lens rear end.
- Securely fit the lens cover at the rear end (with the filter unit) and the front end (with the lens slide base), then fix the lens cover screw. If the lens cover is improperly fixed, the lens may malfunction.


Lens cover
Section A

⑥ Remove the lens fixing spring hook, and remove the lens fixing spring.


Lens
Filter unit
Lens fixing spring

⑦ Pull the lens upwards to remove.

(Note) Be careful not to scratch the lens.

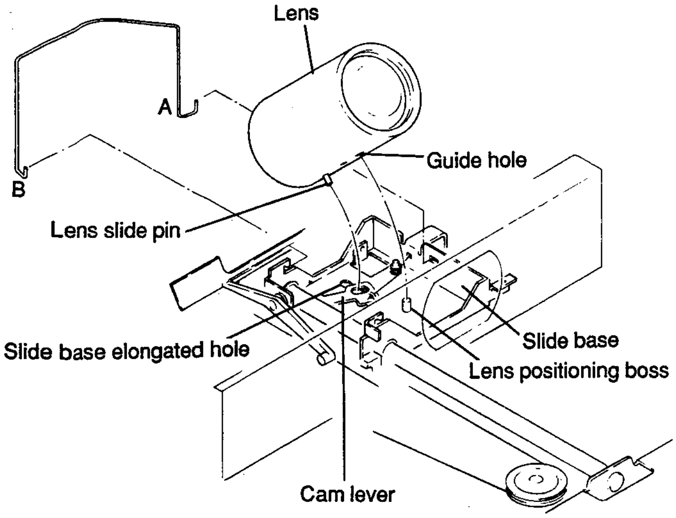
Lens installation

① Make sure that the slide pin of the lens can be slided smoothly.

② Set the lens so that the pin should be engaged in the elongated holes of the slide base and the cam lever, in order that the lens positioning boss may be engaged in the lens guide hole.

NOTE: After replacing, check to ensure that the lens is firmly installed.

③ Hook the section A then B of the lens fixing spring.


Lens
A
B
Guide hole
Lens slide pin
Slide base elongated hole
Slide base
Lens positioning boss
Cam lever

Cleaning procedures

Wipe with lens cleaning solution and lens cloth.

### b. Replacement of the lens slide base

I. Tools required for adjustment

- Plus screwdriver
- Pliers

II. Note

- After replacement of the lens slide base, the focus adjustment (page 8-21) and copy magnification ratio adjustment (page 8-22) must be made.

III. Problems caused by improper procedure

- Lens feeding failure • Lens drive system lock

↓

L5 trouble

IV. Replacement procedure

Removing the lens slide base

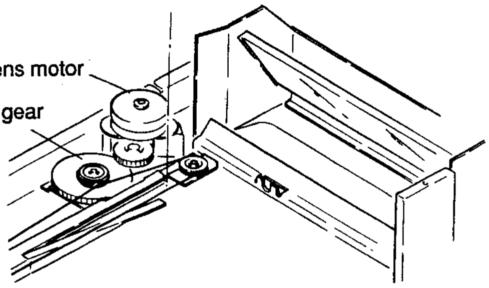
① Remove the lens unit cover.

② Remove the lens cover.

③ Remove the lens.

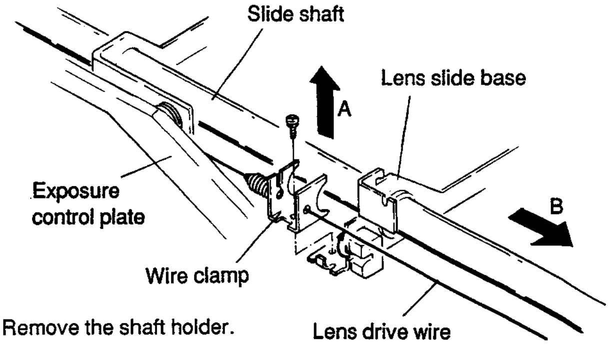
④ Remove the filter unit.

⑤ Rotate the drive gear to shift the lens slide base towards the paper exit side.

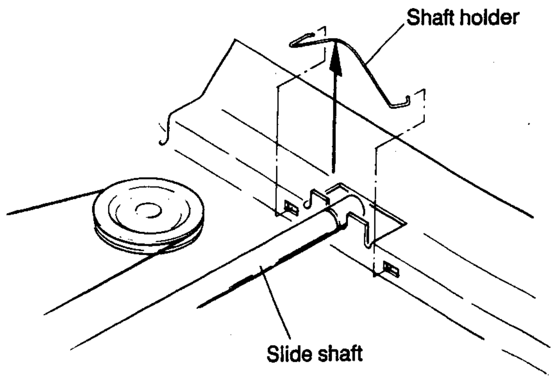

Lens motor
Pulley gear

⑥ Remove the lens drive wire clamp fixing screw.

⑦ Lift up the lens drive wire clamp towards the arrowhead A and move the lens base in the arrow direction B (paper exit side).

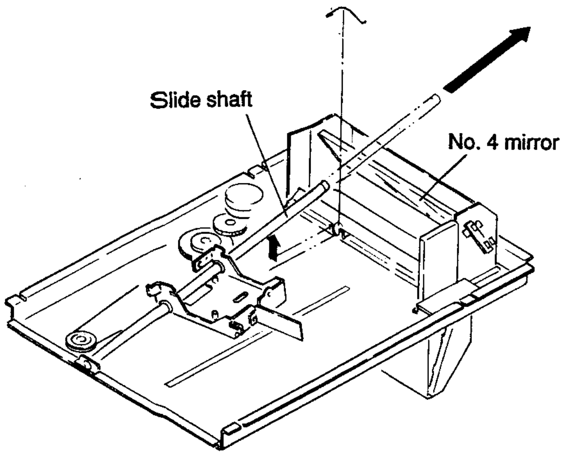

Slide shaft
Lens slide base
A
B
Exposure control plate
Wire clamp
Lens drive wire

⑧ Remove the shaft holder.


Shaft holder
Slide shaft

⑨ Shift the slide shaft to remove as shown in the figure below.

<Note> Be careful not to scratch the No. 4 mirror.


Slide shaft
No. 4 mirror

Installation of the lens slide base

① Rotate the pulley drive gear and move the wire clamp towards the paper exit side.

② Pass the lens drive wire into the lens base notch, and set the wire clamp to the protrusion on the lens slide base.

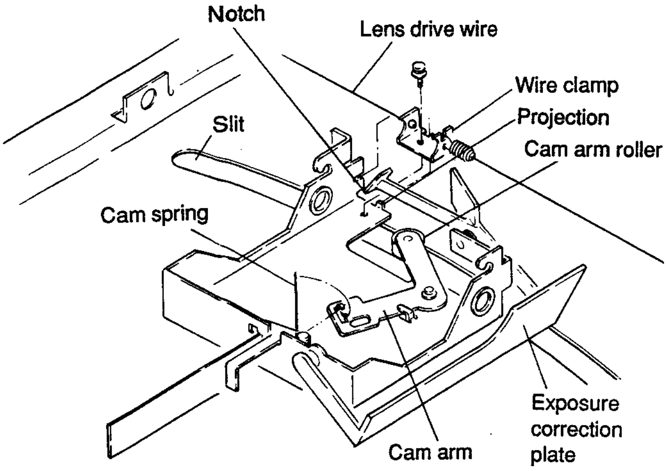
③ Replace the slide shaft.

④ Install the shaft holder and secure the slide shaft.

⑤ Set the cam arm roller in the slit of the lens unit base.

⑥ Hook the cam spring to the cam arm.

⑦ Secure the wire clamp with the screw.


Notch
Lens drive wire
Wire clamp
Projection
Cam arm roller
Slit
Cam spring
Exposure correction plate
Cam arm

## c. Replacement of the lens motor

I. Tools required for adjustment

- Plus screwdriver

II. Problems caused by improper procedure

Lens feeding failure — Lens drive system lock → L5 trouble

III. Replacement procedure

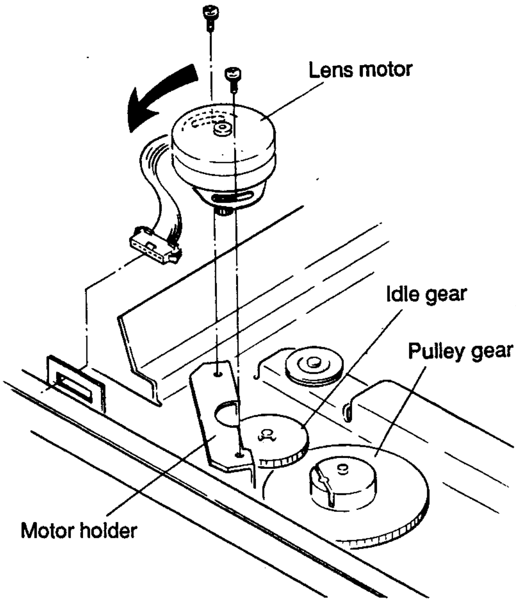
Lens motor attachment

① Set the lens motor in the motor holder bracket.

② Fasten the lens motor with two screws.

③ Rotate the lens motor all the way in the arrow direction and secure the lens motor.

(Note) Be sure to eliminate looseness between the motor gear and the idle gear.


Lens motor
Idle gear
Pulley gear
Motor holder

## d. Replacement of the lens drive wire

I. Tools required for procedure

- Plus screwdriver
- Pliers
- Tweezers

II. Problems caused by improper procedure

Lens feeding failure — Lens drive system lock → L5 trouble

III. Replacement procedure

Removing the lens drive wire

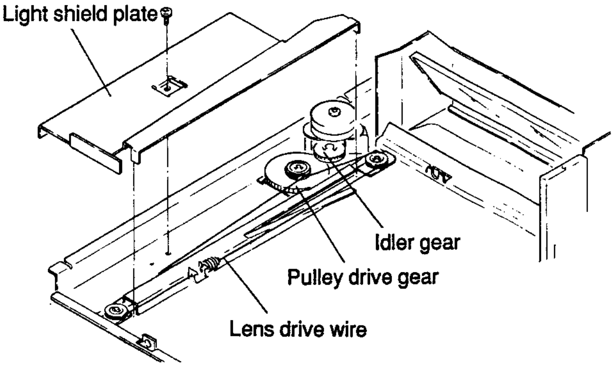
① Remove the lens unit cover.

② Remove the lens cover.

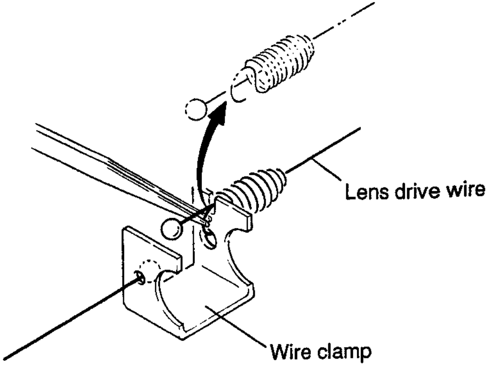
③ Remove the filter unit.

④ Remove the lens slide base.

⑤ Remove the light shield plate.


Light shield plate
Idler gear
Pulley drive gear
Lens drive wire

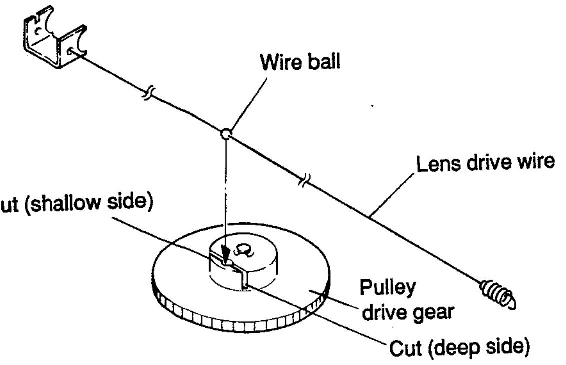
⑥ Remove the lens drive wire from the wire clamp.


Lens drive wire
Wire clamp

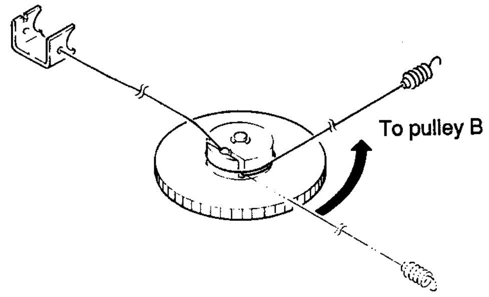
**Stretching the lens drive wire**

① Set the ball of the wire in the cut of the pulley drive gear.

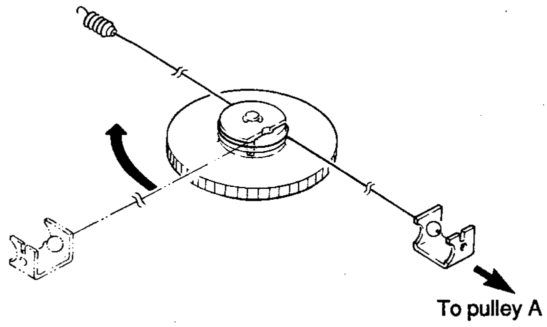
NOTE: The spring side of the lens drive wire must be set deep in the cut of the pulley drive gear.


Wire ball
Lens drive wire
Cut (shallow side)
Pulley drive gear
Cut (deep side)

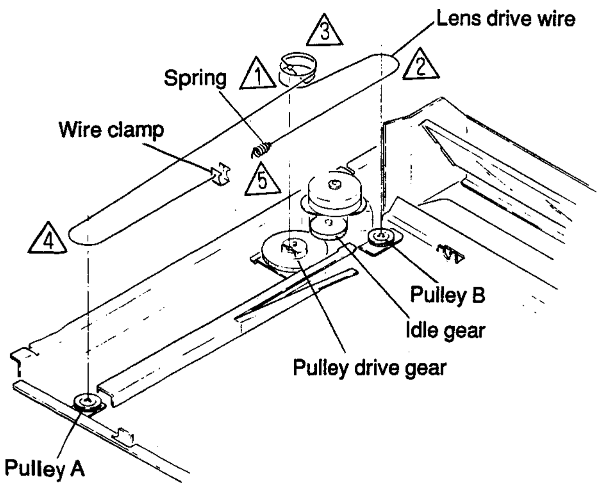
② Make one turn of the spring side of the lens drive wire counterclockwise to the pulley drive gear and set it in the groove of the pulley B.



③ Make one turn of the clamp-side end of the lens drive wire clockwise to the pulley drive gear and set it in the groove of the pulley A.



④ Set the spring of the lens drive wire to the wire clamp.


Lens drive wire
3
Spring
1
2
Wire clamp
5
4
Pulley B
Idle gear
Pulley drive gear
Pulley A

⑤ Replace the light shield plate.

⑥ Replace the lens slide base

⑦ Manually rotate the idle gear and make sure that lens slide base moves smoothly.

### e. Replacement of the exposure correction plate

I. Tools required for replacement

- Plus screwdriver
- Pliers
- Minus screwdriver (small)

II. Note

When the exposure correction plate and the bushing nuts are removed, they must be replaced with new ones. (They may drop during the operation.)

III. Problems caused by improper procedure

- Exposure correction failure
  ↓
  Improper copy density

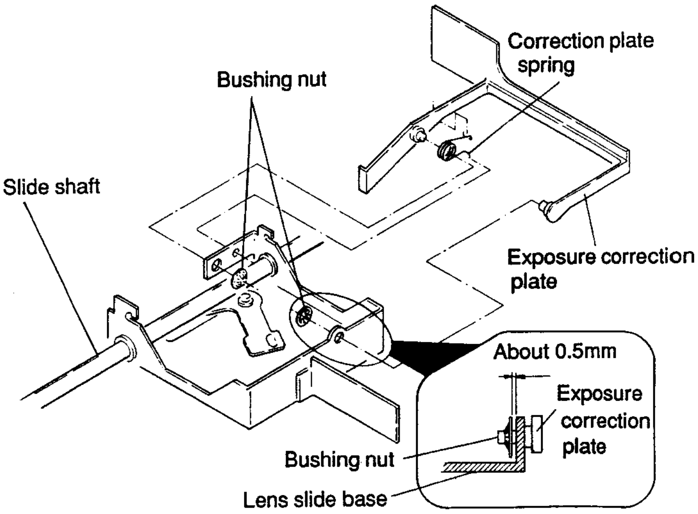
IV. Replacement procedure

**Removing the exposure correction plate**

① Remove the two bushing nuts.

② Remove the exposure correction spring.

③ Extend the exposure correction plate and remove it.


Correction plate spring
Bushing nut
Slide shaft
Exposure correction plate
About 0.5mm
Exposure correction plate
Bushing nut
Lens slide base

**Installation of the exposure correction plate**

Install the exposure correction plate and the bushing nuts so that the clearance between the bushing nut and the lens slide base is about 0.5mm.

## (7) Filter unit

**Removing the filter unit**

① Remove the lens unit cover.

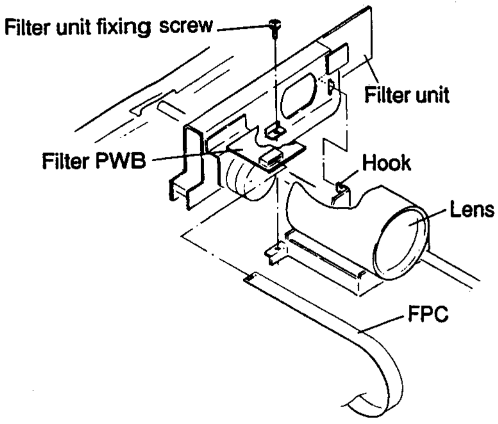
② Remove the lens cover.

③ Remove the filter PWB.

④ Remove the lens home position sensor connector and the filter motor connector from the filter PWB.

⑤ Remove the filter unit fixing screw, then disengage the filter unit from the hook.

NOTE: Do not scratch the lens and the filter.


Filter unit fixing screw
Filter unit
Filter PWB
Hook
Lens
FPC

## a. Filter replacement/cleaning

I. Tools required for procedure

- Plus screwdriver
- Waste cloth

II. Note

- For cleaning, use a lens cloth and lens cleaning solution. Do not wipe too strongly. (Use of alcohol may cause a blur.)
- Be careful not to scratch the filter.
- After replacement of the filter, copy quality adjustment (See page 4-1) and filter home position sensor position adjustment (See page 8-29) must be made.

III. Problems caused by improper procedure

• Filter setting failure • Filter drive system lock

Improper copy color balance F5 trouble

Disassembling the filter

① Make sure that all the filters are in reset state. If it is, in set state rotate the filter drive belt in the arrow direction to reset the filter to its position.

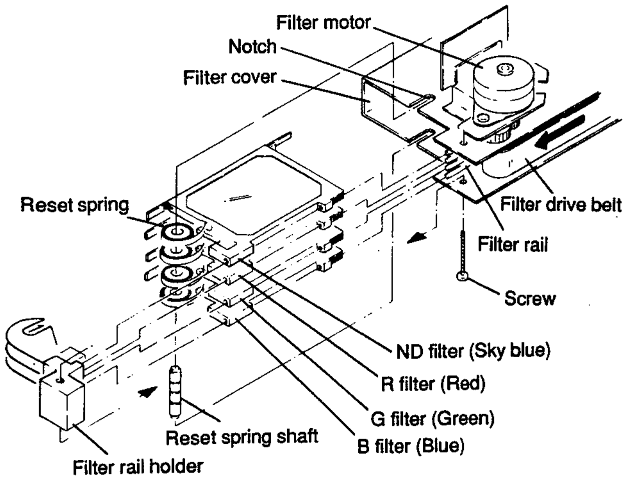
② Remove the filter rail holder screw and remove the rail holder.

③ Remove the reset spring and the filter from the filter cover.

④ Remove the reset spring shaft and remove four flat spiral springs from the filters..

⑤ Remove the filters from the filter rail.

NOTES: • Pay attention not to damage the filter.


Filter motor
Notch
Filter cover
Reset spring
Filter drive belt
Filter rail
Screw
ND filter (Sky blue)
R filter (Red)
G filter (Green)
B filter (Blue)
Reset spring shaft
Filter rail holder

Re-assembling the filter unit

① Replace the reset springs.

② Set filters through the filter rail and insert to the filter cover.

NOTES:
- Note the filter mounting positions when replacing.
- B and G filters could be easily distinguished when looked through white light (daylight, fluorescent light) from the front.

③ Insert the shaft through the centers of the four reset springs and set it to the notch in the filter cover.

④ Replace the filter rail holder to the filter cover.

NOTE: Make sure that the both sides of filter rail are inserted into the filter rail holders.

⑤ Manually rotate the filter drive belt to check that the filters move properly.

Cleaning procedure

① Remove the filter unit.
(No need to remove the filter unit.)

② Rotate the filter drive belt in the direction as shown above.

- The filters are set in sequence.

③ Manually set the filters one by one.

④ Wipe the filter with a lens cloth.

## b. Filter drive belt replacement

I. Tools required

- Plus screwdriver

II. Problems caused by improper procedure

• Filter setting failure • Filter drive system lock

Improper copy color balance

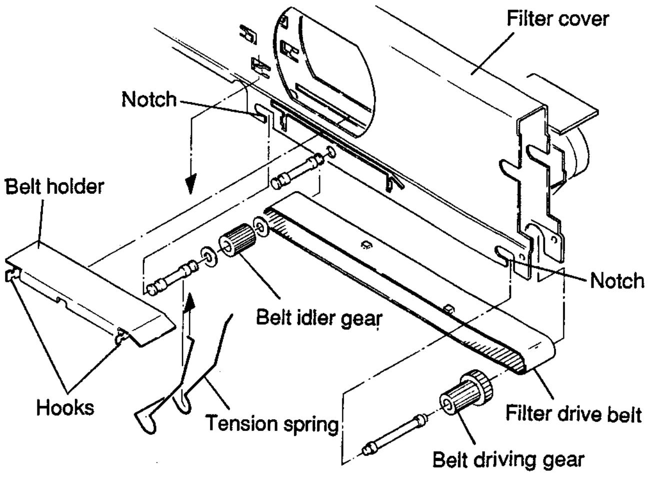
F5 trouble

Removing the filter drive belt

① Push the belt holder hook in the arrow direction to remove the belt holder.

② Remove the belt tension spring.

③ Remove the belt idle gears, belt drive gear, and filter drive belt.


Filter cover
Notch
Belt holder
Notch
Belt idler gear
Hooks
Tension spring
Filter drive belt
Belt driving gear

Installing the filter drive belt

① Set the belt drive gear and the belt drive gear shaft to the filter drive belt, and insert the shaft to the notch in the filter cover.

② Set the belt idle gear and the belt idle gear shaft to the filter drive belt and insert the shaft to the notch in the filter.

③ Replace the tension spring, stretch the filter drive belt, then replace the belt holder.

④ Manually rotate the filter drive belt in the arrowhead to check for a proper movement of the filters.

### c. Replacement of filter home position sensor (FHPS)

I. Tools required

- Plus screwdriver

II. Note

- After replacement of the filter home position sensor, its mounting position must be adjusted. (See page 8-29)

III. Problems caused by improper procedure

- Filter setting failure

Improper copy color balance    F5 trouble

IV. Replacement procedure

Disassembly of the filter home position sensor PWB

① Remove the filter home position sensor connector from the filter sensor PWB.

② Remove the filter sensor PWB from the filter unit.

Installation of the filter home position sensor PWB

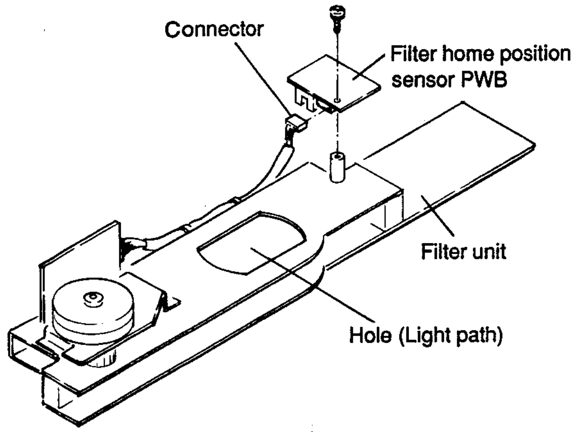
① Attach the filter home position sensor PWB to the filter unit.

② Attach the filter home position sensor connector to the filter home position sensor PWB.

Installation of the filter home position sensor PWB

① Attach the filter home position sensor PWB to the filter unit.

② Attach the filter home position sensor connector to the filter home position sensor PWB.



## (8) Screen replacement/cleaning

I. Tools required for procedure

- Cloth
- Plus screwdriver

II. Note

- When disassembling or assembling the blank lamp/screen unit, the screen must be reset in advance.
- When cleaning the screen, do not use any solvent such as alcohol.
- After replacement of the screen, perform the screen position adjustment. (Refer to page 8-35)
- Carefully protect the screen from scratches and dirt.

III. Problems caused by improper procedure

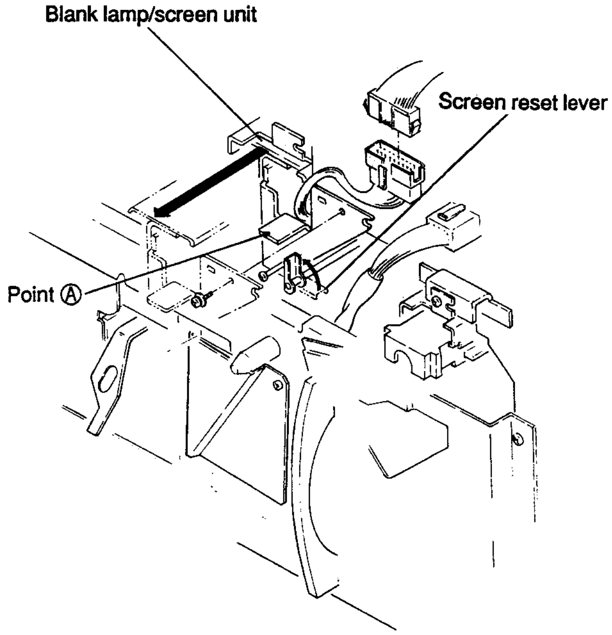
- Improper copy color balance
- Screen damage

IV. Removal/Cleaning/Replacement procedure.

Removing the blank lamp/screen unit

① Remove the door switch cover.

② Reset the screen.

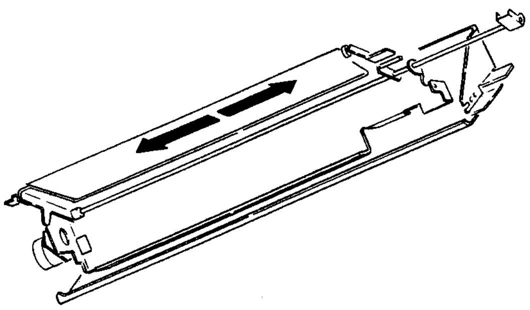


(Caution) Never pull the Screen reset lever when remove the Screen unit. Hold a place of point A then pull out the screen unit. If pull out unit by the screen reset lever, the screen plate may have major damage.

③ Remove the blank lamp/screen unit.

Screen cleaning procedure

① Wipe with cloth in the arrow directions.



# 7. ADJUSTMENTS

## A. General

Adjustments of the optical system are as follows:

| Item No. | Adjustment | Ref. page |
|---|---|---|
| (1) | Image distortion adjustment | 8-20 |
| (2) | Focus adjustment | 8-21 |
| (3) | Copy magnification ratio adjustment | 8-22 |
| (4) | Image center position adjustment | 8-25 |
| (5) | Image loss/void area adjustment | 8-26 |
| (6) | Filter home position sensor (FHPS) position adjustment | 8-29 |
| (7) | CLC PWB adjustment | 8-30 |
| (8) | Uniformity adjustment | 8-31 |
| (9) | AE sensor input level adjustment | 8-32 |
| (10) | AE sensor output characteristics memory | 8-33 |
| (11) | AE sensor limit level setting | 8-34 |
| (12) | Screen position adjustment | 8-35 |

## B. Note

Adjustments of the optical system should be performed in the same sequence as in the above table. If not, proper adjustment will not be made. (To perform one of the above adjustments, all the preceding adjustments should be made in advance.)

## C. Adjustment procedures

### (1) Image distortion adjustment

This adjustment is to remove image distortion by adjusting the mirrors parallel to each other.

① Horizontal image distortion (No. 2 mirror parallelism) adjustment

② Vertical image distortion (Mirror base B vertical parallelism)

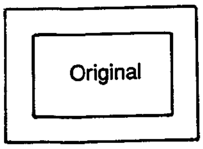
### Horizontal image distortion (No. 2 mirror parallelism) adjustment

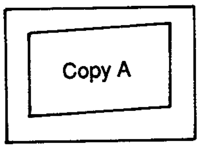
**I. General**

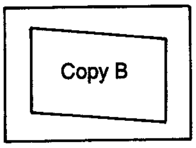
This adjustment is to remove horizontal image distortion by moving the No. 2 mirror front frame side position horizontally in order to adjust the No. 2 mirror horizontal parallelism.

**II. The adjustment should be performed in the following cases:**

- When disassembling or replacing mirror base A
- When disassembling or replacing mirror base B
- When disassembling or replacing lens unit
- When copy image is as shown below:







**III. Tools required for adjustment.**

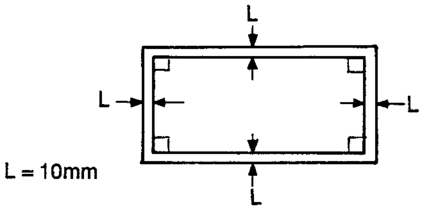
- A3 (11" x 17") copy paper
- Plus (+) screwdriver

**IV. Note**

- After this adjustment, be sure to perform the vertical image distortion adjustment.

**V. Adjustment procedure**

① Using A3 (11" x 17") copy paper, make an original document as shown below: (The rectangle sides must be parallel to the paper sides, and the four corner angles must be 90°.)

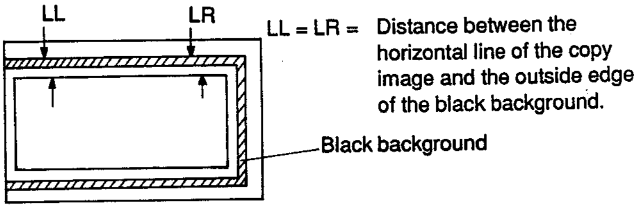


② Set the original on the table glass. (Keep the document cover open.)

③ Make a black-and-white copy in reduction mode 90% with A3 (11" x 17) copy paper.

④ Check horizontal image distortion.

- When LL equals LR, horizontal image distortion is virtually zero. (In that case, horizontal parallelism is satisfactory.)


LL
LR
LL = LR = Distance between the horizontal line of the copy image and the outside edge of the black background.
Black background

If there is some horizontal image distortion, perform the adjustment steps ⑤ through ⑧ until distortion is completely eliminated.

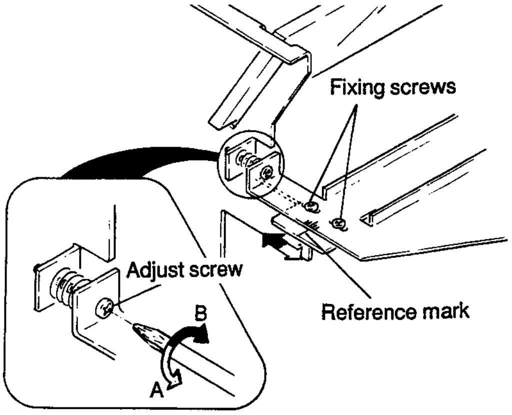
⑤ Remove the table glass.

⑥ Hold the mirror assemblies on the rear frame side and manually slide mirror base A and B to the paper feed side.

⑦ Loosen mirror base B frame fixing screw (red screw).

⑧ Turn and adjust the adjusting screw for adjustment of horizontal image distortion (No. 2 mirror horizontal parallelism).

- For copy A (LL>LR): Turn the adjust screw in the direction of arrow A (counterclockwise).
- For copy B (LL<LR): Turn the adjust screw in the direction of arrow B (clockwise).



Moving the No.2 mirror by one increment on the scale (engraved on mirror base B frame) will change the difference between LL and LR on the copy paper by about 3mm.

⑨ Perform procedures ② ~ ④.

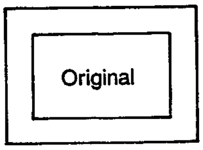
## Vertical image distortion (mirror base B vertical parallelism) adjustment

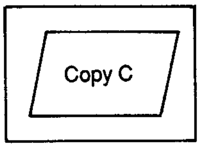
### I. General

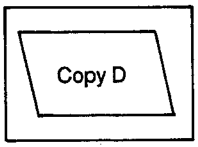
This adjustment is to remove vertical image distortion by moving mirror base B front frame side in order to adjust vertical parallelism.

### II. The adjustments should be performed in the following cases:

- When disassembling or replacing mirror base A
- When disassembling or replacing mirror base B
- When disassembling or replacing mirror lens unit
- When copy image is distorted as shown below:







### III. Tools required for adjustment.

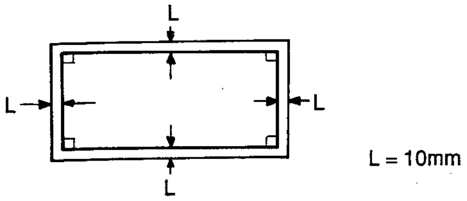
- A3 (11" x 17") copy paper
- Plus (+) screwdriver
- Minus (–) screwdriver

### IV. Note

To perform this adjustment, the horizontal image distortion adjustment must be completed first.

### V. Adjustment procedure

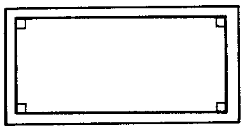
① Using A3 (11" x 17") copy paper, make an original as shown below: (The four corner angles of the rectangle must be 90°.)



② Set the original on the original table.

③ Make a black-and-white copy with A3 (11" x 17") copy paper.

④ Check vertical image distortion. (When the horizontal and vertical lines of a square copy image form a right angle, the vertical image distortion is zero.)



If the vertical image distortion is not zero, perform ⑤ through ⑧ until distortion is completely eliminated.

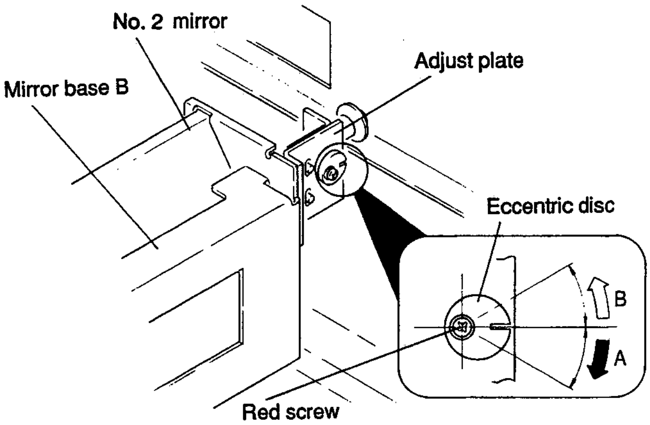
⑤ Remove the original table (table glass).

⑥ Hold the mirror assemblies on the rear frame side and manually slide mirror bases A and B to the paper feed side.

⑦ Loosen the fixing screw (red screw) of the eccentric plate which adjusts vertical parallelism (image distortion) of mirror base B.

⑧ With a minus screwdriver, turn the adjusting eccentric plate of No. 2 mirror vertical parallelism to adjust.

- For copy C : Turn the eccentric plate in the direction of arrow B (counterclockwise).
- For copy D : Turn the eccentric plate in the direction of arrow A (clockwise).



⑨ Perform procedures ② ~ ④.

⑩ Fix the eccentric plate with the fixing screw (red screw).

## (2) Focus adjustment

### I. General

Focus adjustment is performed by changing the installation position of mirror base A relative to the mirror base drive wire, thus changing the distance between the original and the photoconductor belt.

### II. The adjustment should be performed in the following cases:

- When disassembling or replacing mirror base A
- When disassembling or replacing mirror base B
- When replacing the mirror base drive wire
- When disassembling the lens unit
- When replacing the lens or the lens unit
- When image distortion adjustment is performed.
- When focus is incorrect

### III. Tools required for adjustment.

- A3 (11" x 17") copy paper
- Test chart (UKOG-0089CSZZ) or resolution chart
- Plus (+) screwdriver

### IV. Note

- This adjustment should be performed after the completion of image distortion adjustment.
- After this adjustment, always adjust the magnification ratio.

### V. Adjustment procedures

① Set the test chart (UKOG-0089CSZZ) or resolution chart on the original table.

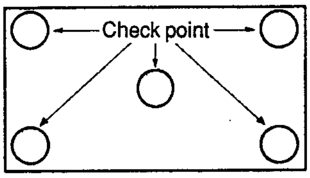
② Make a black-and-white copy in normal copy mode.

③ Check that the resolutions are as follows:

(Standard) (Unit: lines/mm)

| | Copy center | Copy corner |
|---|---|---|
| Normal (100%) | 5.0 | 4.5 |
| Enlargement (101 ~ 154%) | 5.0 | 4.5 |
| Reduction (99 ~ 90%) | 4.5 | 3.6 |
| Reduction (89 ~ 75%) | 3.6 | 3.2 |
| Reduction (74 ~ 64%) | 3.6 | 3.2 |

(Copy)

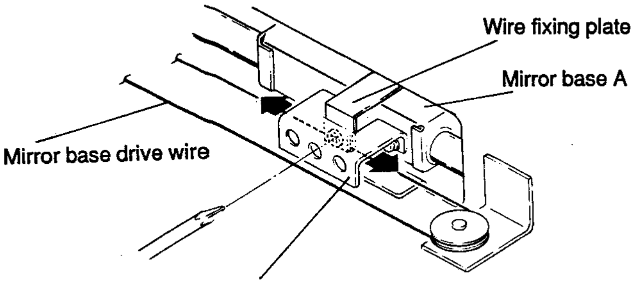


(Resolution standard)
More than half of the copied lines are clearly separated

If the above resolution level is not satisfied, perform steps ④ through ⑥ until the above level is obtained.

④ Loosen the fixing screw which secures the mirror base drive wire to mirror base A.

(Mirror base A and the mirror base drive wire will be separated.)


Wire fixing plate
Mirror base A
Mirror base drive wire
Home position sensor detecting plate

⑤ With the mirror base drive wire held stationary, move mirror base A in the direction of the arrow.

⑥ Tighten the wire fixing screw.

(Mirror base A and the mirror base drive wire will be connected.)

⑦ Perform steps ① – ③.

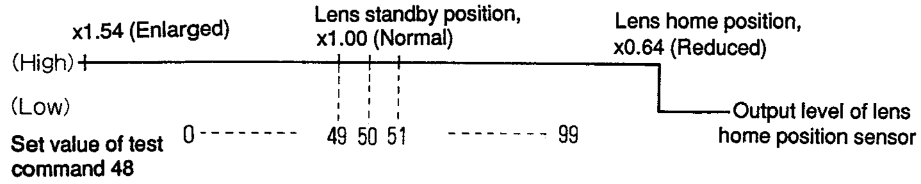
## (3) Copy magnification ratio adjustment

Copy magnification ratio is adjusted both in vertical and horizontal directions by using test commands 48 and 49.

### Vertical copy (lens) magnification adjustment

### I. General

This adjustment uses test command 48 to set the lens home position.


x1.54 (Enlarged)
Lens standby position, x1.00 (Normal)
Lens home position, x0.64 (Reduced)
(High)
(Low)
Output level of lens home position sensor
Set value of test command 48
0
49 50 51
99

### II. The adjustment should be performed in the following cases:

- When mirror base A is disassembled or replaced.
- When mirror base B is disassembled or replaced.
- When the lens unit is disassembled.
- When the lens or lens unit are replaced.
- When image distortion adjustment is performed.
- When the lens home position sensor (LHPS) mounting position is changed.
- When the lens home position sensor (LHPS) is replaced.
- When vertical magnification ratio is outside the specified range.
- When the main PWB is replaced.
- When self diagnosis trouble U2 is eliminated.
- When RAM (IC144, 145) in the main PWB is replaced.

### III. Note

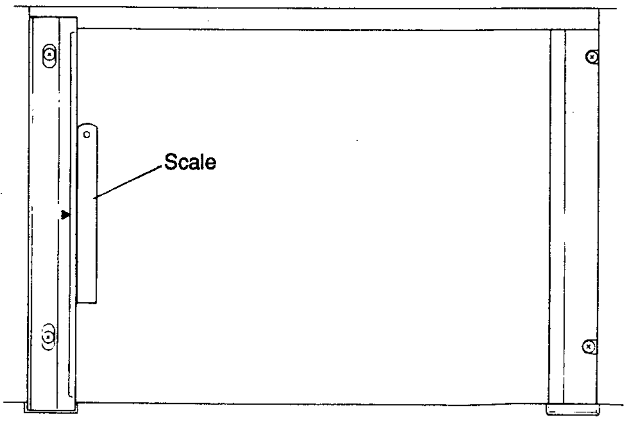
- Before this adjustment, image distortion adjustment and focus adjustment should be completed.
- After this adjustment, horizontal copy magnification ratio should be adjusted.
- When copy magnification ratio display is 100%, specified copy ratio should be 99.75± 0.1%.

### IV. Tools required for adjustment

- A3 (11 " x 17") copy paper
- Scale

### V. Adjustment procedure

① Set a scale vertically on the original table. (The longer the scale is, the more accurate the adjustment will be.)

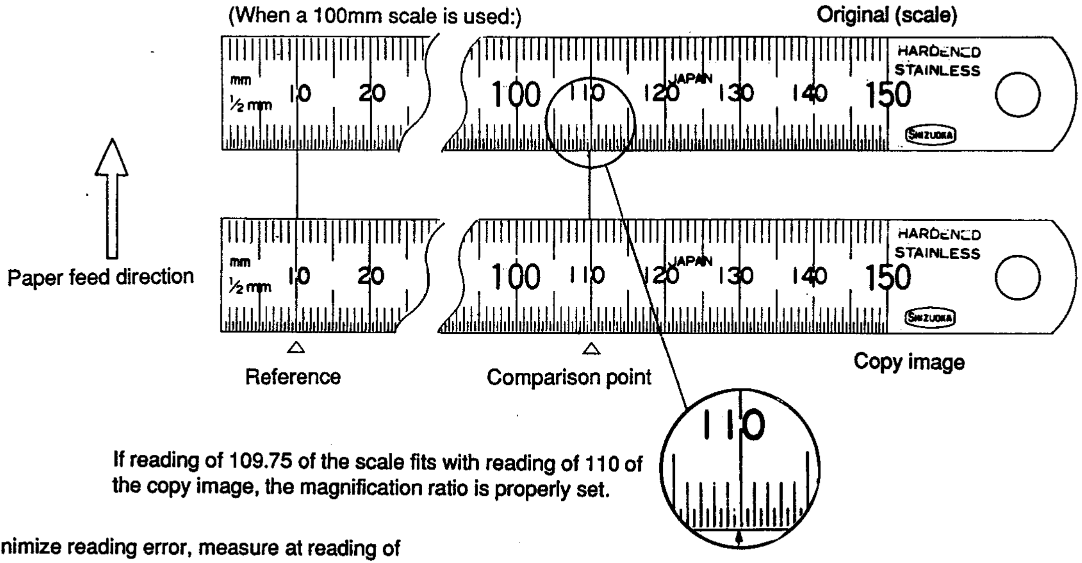


② Set the copy magnification ratio to 100%.

- Copy magnification ratio is displayed as 100%.

③ Make a black-and-white copy with A3 (11" x 17") copy paper.

④ Measure the length of the copied scale image on the copy paper.



If reading of 109.75 of the scale fits with reading of 110 of the copy image, the magnification ratio is properly set.

(Note) To minimize reading error, measure at reading of 110 with the reference at 10.

⑤ Calculate the vertical magnification ratio correction rate.

Vertical copy magnification ratio correction rate =

$$\frac{\text{Original vertical dimension} - \text{Copy image vertical dimension}}{\text{Original vertical dimension}} \times 100 - 0.25\ (*)\ [\%]$$

(Reference)
Vertical copy magnification ratio =

$$\frac{\text{Copy image vertical dimension}}{\text{Original vertical dimension}} \times 100\ [\%]$$

(*) Since the vertical magnification ratio specification is 99.75±0.1% for the displayed copy magnification ratio of 100%, 0.25 is subtracted.
When vertical copy magnification ratio correction rate is 0 ±0.1%, the vertical copy magnification ratio is within the specified range, and no adjustment is required.
If vertical copy magnification ratio is outside the above range, perform steps ⑥ through ⑬.

⑥ Perform test command 48.
(C → 0 → 0 → C → 4 → 8 → COLOR PSW)

- The previously set value is displayed in the copy quantity display.

⑦ Calculate new set value.

New set value = (Previously set value) + [(Vertical copy magnification ratio correction rate) x 26.5]
(Count fractions of .5 and over as a whole number and disregard the rest.)

⑧ Enter the set value with numeric keys.

- The entered value is displayed in the copy quantity display.
  Varying set value by 1 will varies vertical copy magnification ratio correction rate about 0.04%.
  The greater the set value is, the greater the increase in vertical copy magnification ratio will be, and vice versa.

⑨ Depress the COLOR PSW.

- The new set value is stored in test command 48 memory.

⑩ Depress the clear key switch twice to cancel test command 48.

⑪ Make a black-and-white copy using A3 (11" x 17") copy paper.

⑫ Measure the length of the copied scale image on the copy paper.

Repeat steps ⑥ through ⑫ until the vertical copy magnification ratio is within the specified range.

## Horizontal copy magnification ratio adjustment

### I. General

This adjustment uses test command 49 to change mirror base scanning speed for the displayed copy magnification ratio.

### II. Tools required for adjustment

- A3 (11" x 17") copy paper
- Scale
- Plus screwdriver

### III. The adjustment should be performed in the following cases:

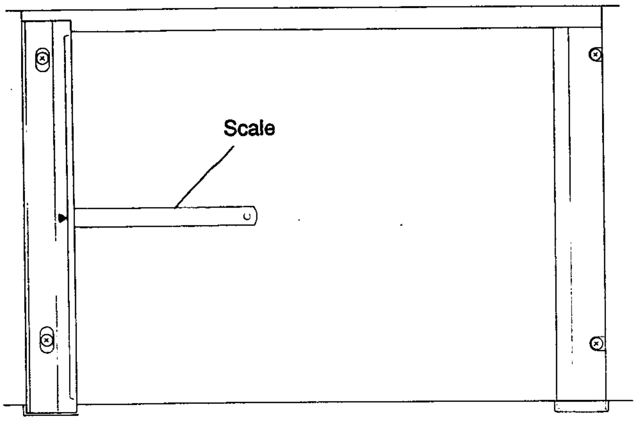
- When mirror base A is disassembled or replaced.
- When mirror base B is disassembled or replaced.
- When the lens unit is disassembled.
- When the lens or lens unit are replaced.
- When image distortion adjustment is performed.
- When the lens home position sensor (LHPS) mounting position is changed.
- When the lens home position sensor (LHPS) is replaced.
- When vertical copy magnification ratio is adjusted.
- When horizontal copy magnification ratio is outside the specified range.
- When the main PWB is replaced.
- When self diagnosis trouble U2 is eliminated.
- When RAM (IC144, 145) in the main PWB is replaced.

### IV. Note

- Before this adjustment, the image distortion adjustment and focus adjustment should be completed.
- The horizontal copy magnification ratio specification for the displayed copy magnification ratio of 100% is 100.25±0.1%.

## V. Adjustment procedure

① Set the scale horizontally on the original table as shown in the figure below.
(The longer the scale is, the more accurate the adjustment will be.)



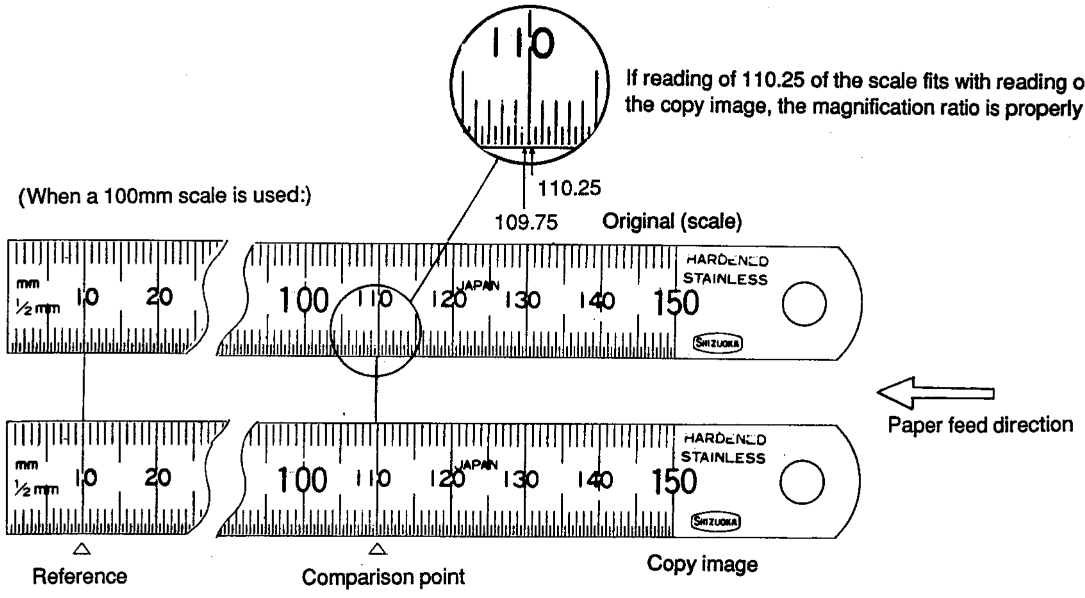
② Set the copy magnification ratio to 100%.

- Copy magnification ratio of 100% is displayed.

③ Make a black-and-white copy with A3 (11" x 17") copy paper.

④ Measure the length of the copied scale image on the copy paper.

(Note) To minimize reading error, measure at reading of 110 with the reference at 10.


110
(When a 100mm scale is used:)
110.25
109.75
Original (scale)
mm
½mm
10
20
100
110
120
130
140
150
JAPAN
HARDENED
STAINLESS
SHIZUOKA
Paper feed direction
Reference
Comparison point
Copy image

If reading of 110.25 of the scale fits with reading of 110 of the copy image, the magnification ratio is properly set.

⑤ Calculate the horizontal copy magnification ratio correction rate.

Horizontal copy magnification ratio correction rate =

$$\frac{\text{Original horizontal dimension} - \text{Copy image horizontal dimension}}{\text{Original horizontal dimension}} \times 100 + 0.25\ (*)\ [\%]$$

(reference)
Horizontal copy magnification ratio =

$$\frac{\text{Copy image horizontal dimension}}{\text{Original (scale) horizontal dimension}} \times 100\ (*)\ [\%]$$

(*) Since the actual copy magnification ratio for the displayed copy magnification ratio of 100% is 100.25±0.1%, 0.25 is added. When the horizontal copy magnification ratio correction rate is 0±0.1%, the horizontal copy magnification ratio is within the specified range and no adjustment is required. When the horizontal copy magnification ratio correction rate is outside the specified range, perform steps ⑥ through ⑬.

⑥ Perform test command 49.
(C → 0 → 0 → C → 4 → 9 → COLOR PSW)

- The previously set value is displayed in the copy quantity display.

⑦ Calculate a new set value.
New set value = (Previously set value) + [(Horizontal copy magnification ratio correction rate) x 10]
(Count fractions of .5 and over as a whole number and disregard the rest.)

⑧ Enter the calculated new set value using the 10-key pad.

- The entered new set value is displayed in the copy quantity display.
  Changing the set value by 1 will change the horizontal copy magnification ratio correction rate by about 0.1%.
  The greater the set value is, the greater the actual copy magnification ratio for the displayed copy magnification ratio is, and vice versa.

⑨ Depress the COLOR PSW.

- The new set value is stored in test command 49 memory.

⑩ Depress the clear key twice to cancel test command 49.

⑪ Make a black-and-white copy with A3 (11" x 17") copy paper.

⑫ Measure the length of the copied scale image on the copy paper.

Repeat steps ⑥ through ⑫ until the horizontal copy magnification ratio is within the specified range.

## (4) Image center position adjustment

### I. General

This adjustment is done to align the original image center position and the copy image center position by moving the glass holding plate.

### II. Tools required for adjustment

- A3 (11" x 17") copy paper
- Plus (+) screwdriver

### III. The adjustment should be performed in the following cases:

- When the lens is replaced.
- When the lens unit is disassembled or replaced.
- When the paper feed unit is disassembled or replaced.
- When the original image center position does not fit with the copy image center position.

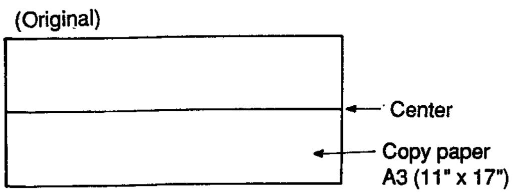
### IV. Note

- After this adjustment, the blank lamp position must be adjusted.
- The reference value of the copy image center position to the original image center position is 0±2.0mm.

### V. Adjustment procedure

① Using A3 (11" x 17") copy paper, make an original as shown below:

- Fold the copy paper in two, and draw a line along its center.

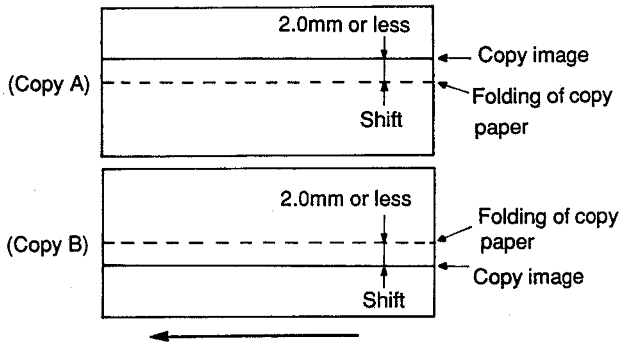


② Set the original on the table glass aligned with the glass holding plate scale as the reference.

③ Make a normal (100%) black-and-white copy on A3 (11" x 17") copy paper.

④ Check the shift between the original image center position and the copy image center position.

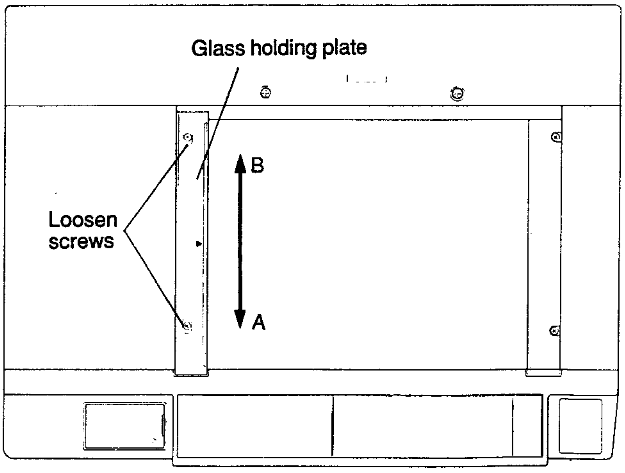
- Fold the copy paper in two and measure the dimensional difference between the copy image and the center line of the folded copy paper.



If the shift between the copy image and the copy paper folding center is 2.0mm or more, perform step ⑤ until the shift is within 2mm. If the shift is within 2.0mm, the adjustment is completed.

⑤ Move and adjust the glass holding plate in the direction of arrows.

- For copy A: Move the glass holding plate in the direction of arrow B.
- For copy B: Move the glass holding plate in the direction of arrow A.

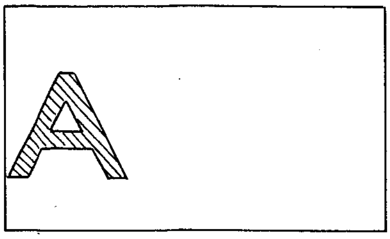


⑥ Perform steps ② ~ ④.

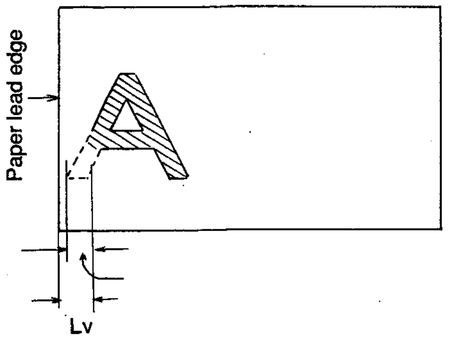
## (5) Image loss/void area adjustment

Void area: Where there is no toner on the copy paper.
Image loss: Where there is no image on the copy paper.

(Original)



(Copy)



Li: Lead edge image loss
Lv: Lead edge void area
(In some cases, Li ≧ Lv)

This adjustment is performed by changing mirror scan start timing, resist roller ON timing, and blank lamp OFF timing with test commands 50 and 58.

### Copy image position (Mirror base scan start timing)/(Resist roller on timing) adjustment

### I. General

This adjustment is done to register the paper and copy image positions by changing the resist roller ON timing and the mirror base scan start timing.

Use test command 50 for the above operation.

### II. Purpose

This is to adjust the image registration on the copy paper.

### III. The adjustment should be performed in the following cases:

- When mirror base A is disassembled or replaced.
- When mirror base B is disassembled or replaced.
- When the lens unit is disassembled.
- When the image distortion adjustment is made.
- When the mirror home position sensor (MHPS1/MHPS2) mounting position is changed.
- When the mirror home position sensor (MHPS1/MHPS2) is replaced.
- When the main PWB or RAM (IC144, 145) on the main PWB is replaced.
- When self diagnosis U2 is eliminated.
- When the resist roller is disassembled or replace.
- When the resist roller clutch (RRC) is disassembled or replaced.

### IV. Tools required for adjustment

- A4 (11" x 8 1/2") copy paper
- Scale or test chart

### V. Note

- After this adjustment is made, be sure to make void area (blank lamp OFF timing) adjustment.
- Image position standard value is 0±1.0mm.

### VI. Adjustment procedures

① Perform test command 50.
(C → 0 → 0 → C → 5 → 0 → COLOR PSW)

- Memory lamp M2 lights up. (RRC-B value input mode is obtained.)
- Copy magnification ratio of 154% is displayed.
- The previously set value of RRC-B (set value of the mirror base scan start timing) is displayed in the copy quantity display.

② Enter 0 using the 10-key pad.

- "0" is displayed in the copy quantity display.

③ Depress the black-and-white PSW.

- RRC-B value is set to 0.
- A copy is produced.

④ Depress the memory key switch to turn off memory lamp M2. (RRC-A value input mode is obtained.)

- The previously set RRC-A value (resist roller ON timing set value) is displayed in the copy quantity display.

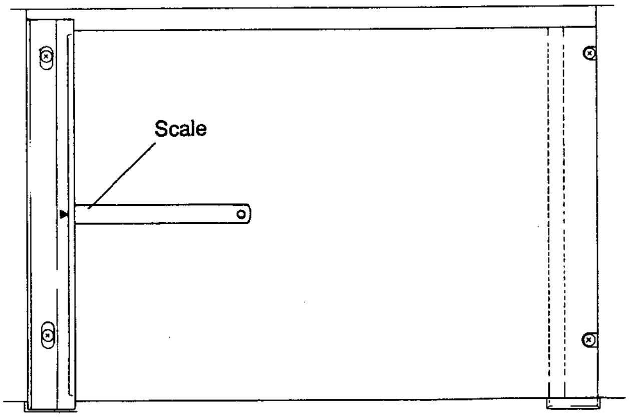
⑤ Enter 0 using the 10-key pad.

- "0" is displayed in the copy quantity display.

⑥ Depress the black-and-white PSW.

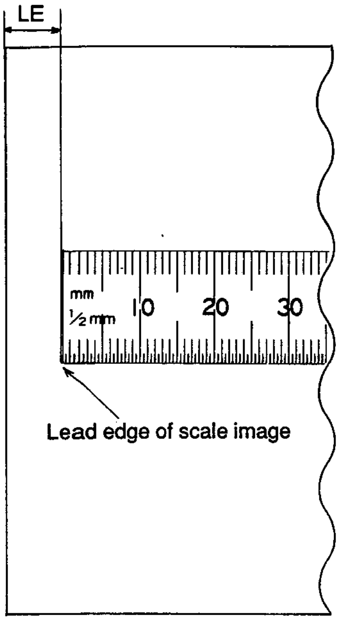
- RRC-A value is set to 0.
- A copy is produced.

⑦ Set the scale on the original table as shown below:



⑧ Make 5 copies in the black-and-white copy mode in magnification ratio of 154%.
(Five sheets of multi-copy are produced when the recall counter lamp is lighted and PSW is turned on with the recall counter key switch.)

⑨ Measure the length (LE) from the paper lead edge to the lead edge of the copy image.



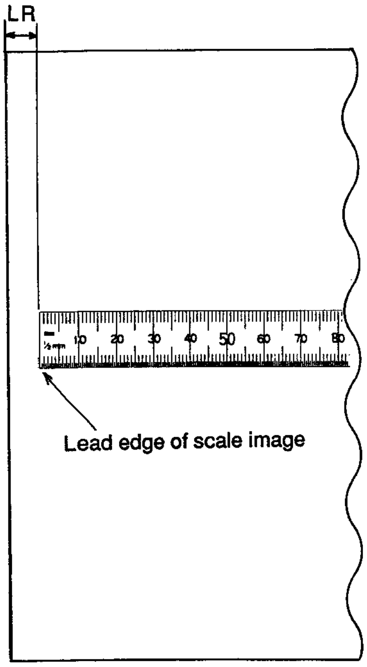
Enlarged copy (x1.54)

⑩ Calculate the average value of LE from the 5 copies produced.

⑪ Make 5 copies in the black-and-white copy mode in magnification ratio 64%.

(Five sheets of multi-copy are produced when the recall counter lamp is slighted and PSW is turned on with the recall counter key switch.)

⑫ Measure the length (LR) from the paper lead edge to the lead edge of the copy image.



Reduction copy (x0.64)

⑬ Calculate the average value of LR from the 5 copies produced.

⑭ Obtain RRC-A and RRC-B from the formula.

(Formula)

$$\text{RRC-A} = \frac{1.54 \times LR - 0.64 \times LE}{0.18}$$

$$\text{RRC-B} = \frac{LE - LR}{0.18}$$

(Fractions under the decimal point are rounded.)

⑮ Confirm that the memory lamp M2 is turned off. (RRC-A input mode is displayed.)

⑯ Enter the RRC-A set value using the 10-key pad.

- The entered RRC-A value is displayed in the copy quantity display.

⑰ Depress the black-and-white PSW.

- The RRC-A value entered in ⑯ is set.
- A copy is produced.

⑱ Depress the memory key switch to turn on the memory lamp M2. (The RRC-B value input mode is displayed.)

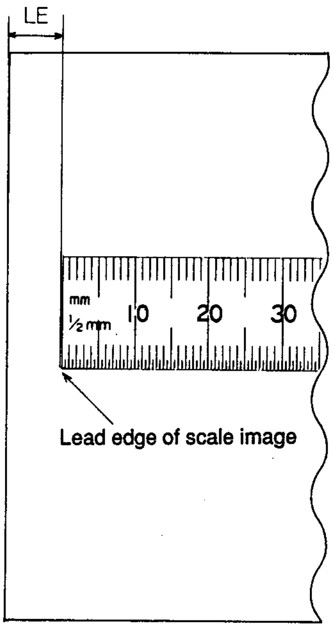
⑲ Enter the RRC-B set value using the 10-key pad. The entered RRC-B value is displayed in the copy quantity display.

⑳ Depress the black-and-white PSW.

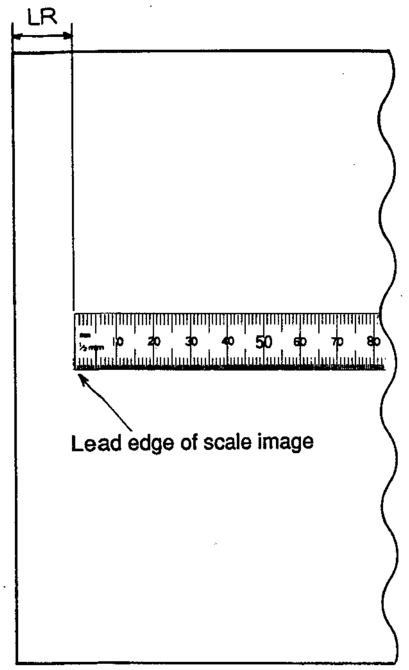
- The RRC-B value entered in ⑲ is set.
- A copy is produced.
  The RRC-A set value determines the resist roller ON timing. Changing the RRC-A value by 1 will change the paper position to the copy image by about 0.2mm.
  Increasing the RRC-A value delays the resist roller ON timing, resulting in greater image loss at the copy lead edge.
  Decressing the RRC-A value advances the resist roller ON timing, resulting in greater void area at the copy lead edge.
  The RRC-B set value determines the mirror base scan start timing and the copy image reference position on the TX belt.
  Improper setting of the RRC-B value results in greater fluctuations in the copy image position to the copy paper in proportion to the copy magnification ratio.

㉑ Check if the RRC-B set value is correct or in need of readjustment.
Make 4 or 5 black-and-white copies in 154% and 64% modes.
If the difference between the distance (LE) from 154% copy image edge to the paper edge and the distance (LR) from 64% copy image edge to the paper edge is within 0 ± 1.0mm, the RRC-B set value is correct.

$|LE - LR| < 1.0\text{mm}$



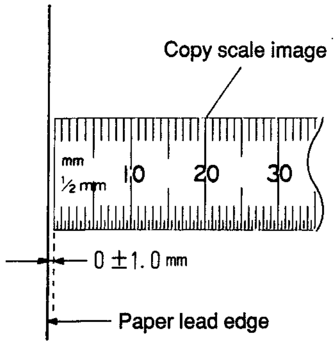
Enlarged copy (x1.54)



Reduction copy (x0.64)

㉒ If the RRC-B set value is not correct, slightly change the RRC-B set value obtained in step ⑭. Repeat steps ⑱ through ㉒ until a proper RRC-B set value is obtained.

㉓ Check if the RRC-A set value is correct or in need of readjustment.
Make 4 or 5 black-and-white copies in normal (100%) mode.
If the shift between the paper edge and the copy image edge is within 0±1.0mm, the RRC-a set value is correct.



㉔ If the RRC-A set value is not correct, slightly change the RRC-A set value obtained in step ⑭. Repeat steps ⑮, ⑯ ⑰, ㉓ and ㉔ until the proper RRC-A value is obtained.

㉕ Depress the clear key switch twice to clear test command 50.

## Void area/image loss adjustment

### I. General

This adjustment uses test command 58 to change the OFF timing of the blank lamp (BL).

### II. Purpose

This adjustment is to improve separation of paper in the fusing and TX blocks.

### III. The adjustment should be performed in the following cases:

- When the main PWB or RAM (IC141, 145) on it is replaced.
- When self diagnosis status U2 is eliminated.
- When the copy image position is adjusted.
- When the blank lamp (BL) is disassembled, assembled or replaced.

### IV. Tools required for adjustment

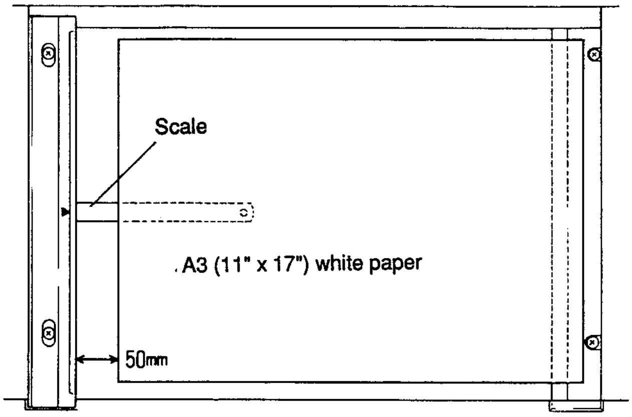
- A4 (11" x 8 1/2") copy paper
- Scale or test chart

### V. Note

- Before this adjustment, the copy image lead edge (resist roller ON timing/mirror base scan start timing) adjustment must have been properly done.
- The void area reference value is 5±0.5mm.

### VI. Adjustment procedures

① Set the scale and A3 (11" x 17") white paper on the original table as shown below:



② Perform test command 58.

(C → 0 → 0 → C → 5 → 8 → COLOR PSW)

- The previously set void area adjusting value is displayed in the copy quantity display.

③ Enter 99 using the 10-key pad.

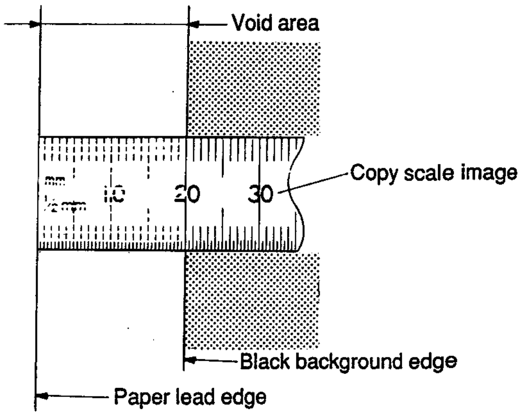
- "99" is displayed in the copy quantity display.

④ Depress the black-and-white PSW.

- The void area adjusting set value is set to 99.
- A copy is produced.

⑤ Make 5 black-and-white copies in normal (100%) mode with the document cover open.
(When the recall counter lamp is lighted with the recall counter key switch and PSW is depressed, five copies are produced.)

⑥ Measure the copy lead edge void area.



⑦ Calculate the average lead edge void area from the 5 copies produeced.

⑧ Calculate the void area adjusting set value.

Set value =

$$(\text{Current set value}) - \frac{(\text{Average lead edge void area}) - 5\ (\text{mm})}{0.2}$$

⑨ Enter the set value calculated in ⑧ using the 10-key pad.

- The entered value is displayed in the copy quantity display.

⑩ Depress the black-and-white PSW.

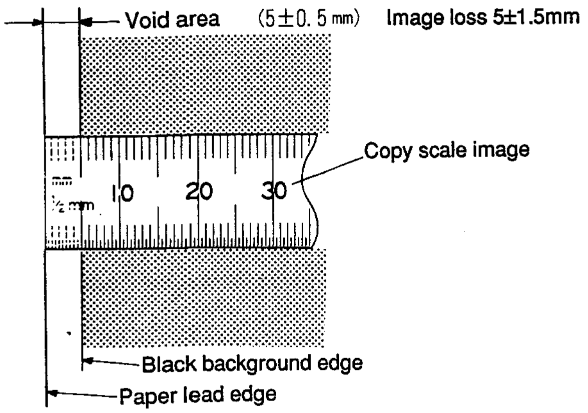
- The void area adjust set value entered in ⑨ is set.
- A copy is produced.

⑪ Make 5 black-and-white copies in normal (100%) mode. (When the recall counter lamp is lighted with the recall counter key switch and PSW is turned on, five copies are produced.)

⑫ Measure the copy lead edge void area.

⑬ Calculate the average copy lead edge void area from the 5 copies produced.

⑭ Check that the average copy lead edge void area is within 5±0.5mm. (Image loss 5±1.5mm)


Void area (5±0.5 mm)
Image loss 5±1.5mm
Copy scale image
10
20
30
Black background edge
Paper lead edge

If the void area is outside the above range, repeat procedures ⑤ through ⑭ until it is within the above specified range.
The greater the void area adjust set value is, the greater the copy lead edge void area will be.
The smaller the void area adjust set value is, the smaller the copy lead edge void area will be.

⑮ Depress the clear key switch twice to clear test command 58.

## (6) Filter home position sensor (FHPS) position adjustment

### I. General

This adjustment is performed by moving the mounting position of the filter home position sensor (FHPS).

### II. Purpose

The adjustment is to set the filter to the proper position (the open section in center of light path.

### III. The adjustment should be performed in the following case:

- When the FHPS is disassembled or replaced.

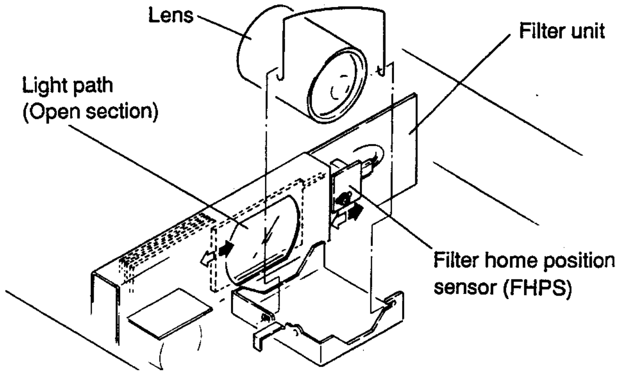
### IV. Tool required for adjustment

- Plus (+) screwdriver

### V. Adjustment procedure

① Remove the lens. (See page 8-14)

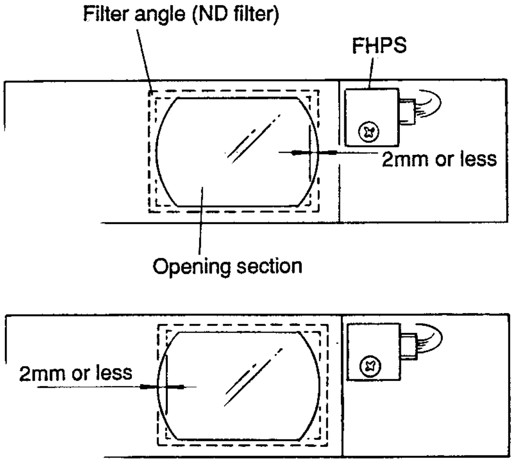
② Temporarily fix the filter home position sensor (FHPS) to the filter unit.


Lens
Filter unit
Light path
(Open section)
Filter home position
sensor (FHPS)

③ Turn the power switch OFF and ON.

- The ND filter is set.

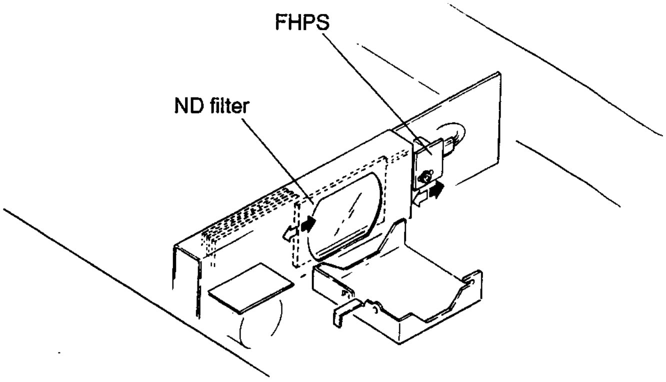
④ Check that the ND filter is set at the center of the light path (open section).


Filter angle (ND filter)
FHPS
2mm or less
Opening section
2mm or less

Note: The filter angle should not cover the opening more than 2.0mm.

If the ND filter is shifted from the center of the light path (opening section), perform procedures ⑤ and ⑥ until the shift is within 2.0mm.

⑤ Move the filter home position sensor (FHPS) in the direction of arrow.


FHPS
ND filter

⑥ Perform steps ② through ④.

⑦ Fix the filter home position sensor (FHPS).

⑧ Reinstall the lens.

## (7) CLC PWB ADJUSTMENT

### I. General

The CLC PWB is adjusted to determine the copy lamp basic drive voltage by means of test command 7. Copy lamp drive voltage for each copy mode is established on the basis of the basic copy lamp drive voltage.

### II. The adjustment should be performed in the following cases:

☆ After replacement of the CLC PWB

☆ After replacement of a component within the CLC PWB

### III. Note

- The copy quality needs to be adjusted after this adjustment is made.
- Do not execute test command 7 in succession. Otherwise, it may create one of the following troubles.

☆ If the same area of the photoconductor belt is exposed continuously, fatigue occurs in part of the photoconductor belt and creates uneven density in the image corresponding to that area.

☆ The document table is distorted due to an abnormally high temperature in the table glass.

### IV. Problem caused by improper adjustment

- Improper copy density

### V. Adjustment procedures

Note: Move the mirror base (scanner) to the middle position and open the original cover. This would prevent any damage to the PC belt.

① Execute test command 7 by entering C → 0 → 0 → C → 7 → COLOR PSW.

- The COLOR COPY lamp comes active.
- "1" is displayed in the copy number window.

② Push the numerical key "2".

- The COLOR COPY lamp comes active.
- "2" is displayed in the copy number window.

③ Measure the voltage across CLC PWB test point Vrms and GND using the DC voltmeter.

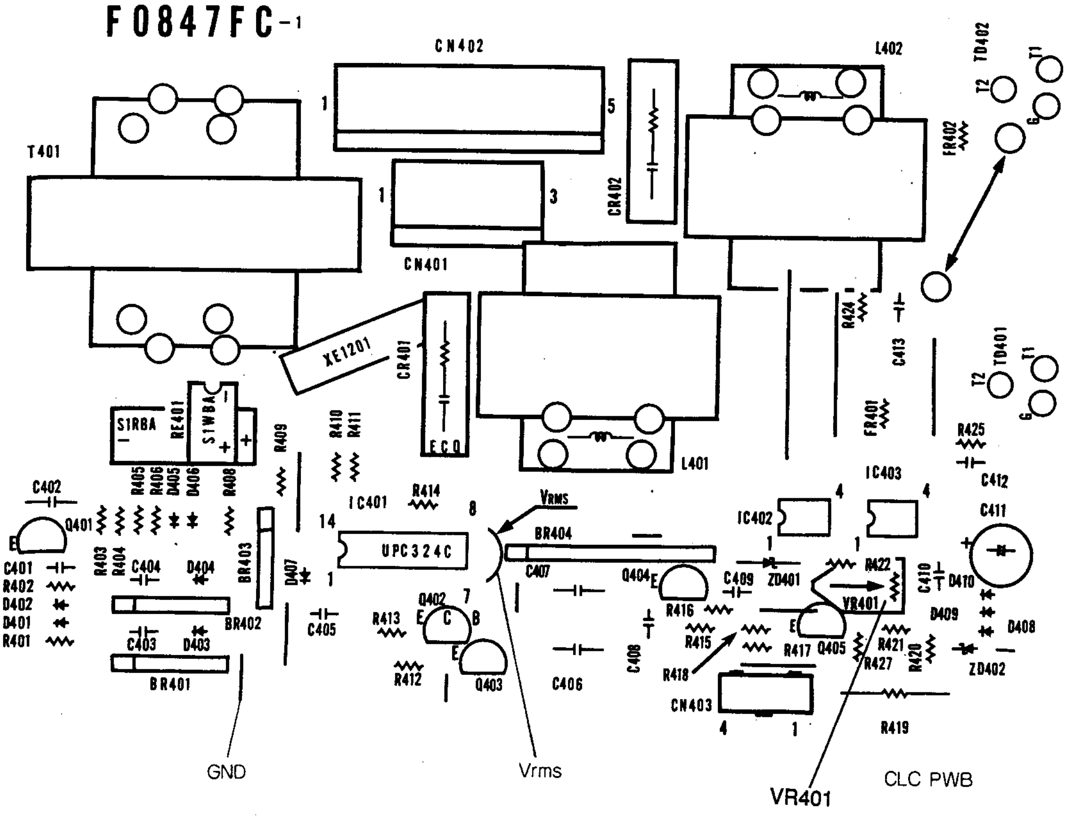
④ Push the COLOR PSW.

- As the CLC PWB turns active for a period of 6 seconds, the copy lamp comes active.

⑤ Adjust potentiometer VR401 on the CLC PWB while the copy lamp is active so that the voltage between Vrms and GND. (See the table below)

| Power spec. | Voltage between Vrms and GND |
|---|---|
| 200V, 50Hz | 7.8±0.05V |
| 220/240V, 50Hz | 7.85±0.05V |
| 220V, 60Hz | 7.9±0.05V |
| 100V system, 50Hz | 7.85±0.05V |
| 100V system, 60Hz | 7.9±0.05V |

⑥ Push the CLEAR key twice to cancel the test command 7.


F0847FC-1
CN402
L402
TD402
T401
CN401
CR402
FR402
XE1201
CR401
TD401
S1RBA
RE401
S1WBA
R409
R410
R411
C413
R424
FR401
R425
C412
L401
IC403
C402
Q401
R405
R406
D405
D406
R408
IC401
R414
VRMS
IC402
C411
UPC324C
BR404
C401
R402
D402
D401
R401
R403
R404
C404
D404
BR403
D407
C407
Q404
C409
ZD401
R422
C410
D410
VR401
Q402
C405
R413
R416
D409
D408
C403
D403
BR402
R415
R417
Q405
R421
R420
ZD402
BR401
R412
Q403
C406
C408
R418
R427
CN403
R419
GND
Vrms
VR401
CLC PWB

## (8) Uniformity adjustment

### I. General

The uniformity adjustment is made by changing the mounting position of the exposure control plates at mirror base A to supply uniform copy lamp exposure on the original.

This machine uses two copy lamps. The adjustment is made first when only one lamp is on, then when both lamps are on.

### II. Purpose

The adjustment is to provide uniform copy density.

### III. The adjustment should be performed in the following cases:

☆ When mirror base a is disassembled or assembled.

☆ When mirror base A is replaced.

☆ When the copy lamp is replaced.

☆ When maintenance is performed.

☆ When the reflector is replaced.

### IV. Tools required for the adjustment

- Plus screwdriver
- A3 (11" x 17") copy paper
- A3 (11" x 17") half-tone document

### V. Note

- This adjustment should be performed before the copy quality adjustment.
- After this adjustment, the copy quality adjustment must be performed.
- The adjustment must be performed in the following sequence for the both sides.

① Uniformity adjustment when the main copy lamp is on. (Only one copy lamp is on.)

② Uniformity adjustment when the main copy lamp and the sub copy lamp are on. (The two copy lamps are on.)

### VI. Problems caused by improper adjustment

- If this adjustment is not performed properly, the following troubles may occur.

Uneven exposure
↓
Partially insufficient copy density
Partially excessive copy density
Background is partially copied.
Improper color copy balance

### VII. Adjustment procedures

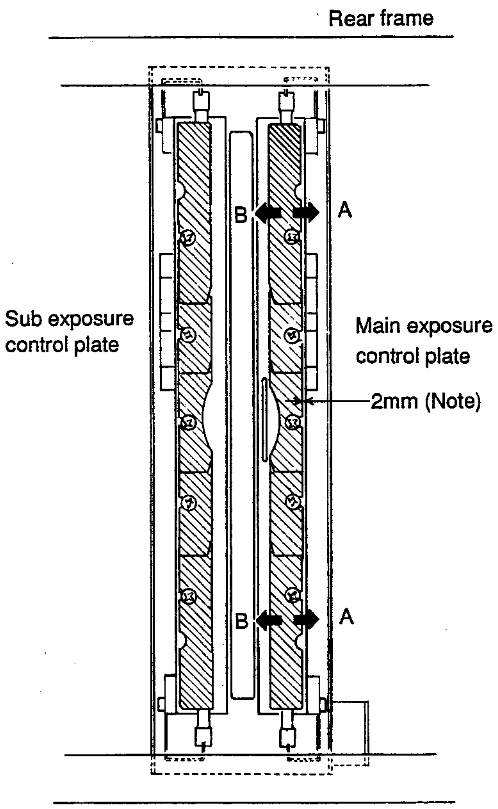
① Set a half tone original of A3 (11" x 17") copy paper on the original table.

② Set to the monochrome photo magenta copy mode.

- Photo copy mode lamp turns on.
- Monochrome magenta lamp turns on.

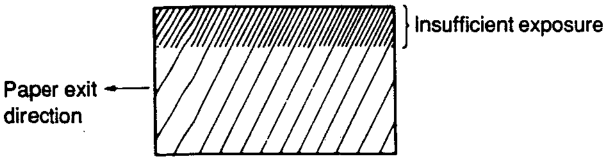
③ Depress the COLOR PSW.
A monochrome magenta copy is produced. (A3 (11" x 17") copy paper)
(At that moment, the main copy lamp is on.)

④ Check the copy image for unevenness.
If there is density unevenness in the copy image, make a another cyan copy by cyan mode fr checking the filter evenness, then shift the mounting positions of the main exposure control plates on the main reflector in the direction of arrows A and B.
When the main exposure control plates are shifted in the direction of arrow A, copy density becomes smaller (lighter).
When the main exposure control plates are shifted in the direction of arrow B, the copy density becomes greater (darker).



(Note) The position of center main exposure control plate should be adjusted so that the distance between the edge of main exposure control plate C and the edge of the main reflector is within 2mm in direction B. (No limitation for distance in direction A.)
If not, the AE sensor cannot properly detect the original exposure level.

(Example) When a copy as shown below is taken, shift front frame side main exposure control plate in direction of A to balance the exposure.


Insufficient exposure
Paper exit direction

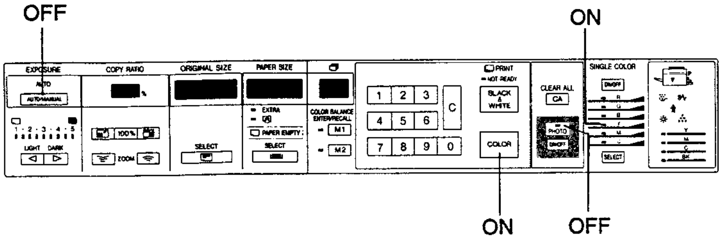
Half tone copy

⑤ Perform test command 46 to set to the monochrome graphic yellow copy mode.
(C → 0 → 0 → C → 4 → 6 → COLOR PSW)

- The machine starts warming up.
- The color copy ready lamp lights up.

⑥ Turn off the photo copy mode lamp with the photo/graphic copy mode select key.

⑦ Turn on the monochrome yellow lamp with the monochrome copy select key.


OFF
ON
EXPOSURE
AUTO
COPY RATIO
ORIGINAL SIZE
PAPER SIZE
PRINT
CLEAR ALL
CA
SINGLE COLOR
COLOR
ZOOM
SELECT
M1
M2
ON
OFF

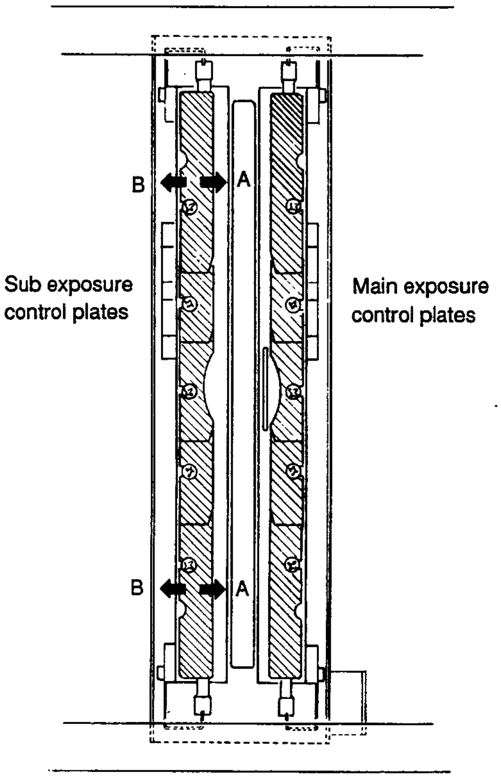
⑧ Depress the color PSW.

- A monochrome yellow color copy is taken. (A3 (11" x 17") copy paper.)
(At that time, the main copy lamp and the sub copy lamp are lighted.)

Note: Adjust the copy density set value to obtain a moderate copy lamp light quantity suitable for adjustment. At that time, memorize the set value, change it, then return to the originally set value after uniformity adjustment.

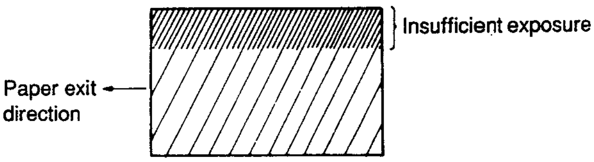
⑨ Check the copy image for unevenness.

If there is density unevenness in the copy image, shift the position of sub exposure control plates in the direction of arrow A or B.
When sub exposure control plates are shifted in the direction of arrow B, the copy density becomes smaller.
When sub exposure control plates are shifted in the direction of arrow A, the copy density becomes greater.


B
A
Sub exposure control plates
Main exposure control plates
B
A

Example: When a copy as shown below is taken, shift sub exposure control plate F in the direction of arrow B to balance the exposure.

⑩ Depress the clear key to clear test command 46.


Insufficient exposure
Paper exit direction

Half tone copy

(Reference)
When checking uniformity of copy image density, it is advisable to adjust the overall exposure (copy density) level to a suitable level for checking.

## (9) AE sensor input level adjustment

### I. General/purpose

This adjustment is used to set the AE sensor operating point to the point where unsaturated dynamic range is maximum in order to improve the AE sensor measuring accuracy, thus providing the optimum density in full color photo auto copy mode and the black-and-white graphic auto copy mode.
This adjustment uses test command 55.

### II. The adjustment should be performed in the following cases:

- When mirror base A is disassembled.
- When the copy lamp reflector is replaced or cleaned.
- When the exposure control plate position is changed. (When uniformity adjustment is performed.)
- When the AE sensor is replaced.
- When the copy lamp is replaced.

- When the slave PWB is replaced.
- When VR 201 on the slave PWB is replaced.
- When the main PWB is replaced.
- When the RAM (IC144, 145) on the main PWB is replaced.
- When maintenance is performed.

### III. Tools required for the adjustment

- Minus (–) screwdriver for adjustment
- A3 (11" x 17") copy paper

### IV. Note

- When this adjustment is made, the following procedures must be performed:
  (AE sensor output characteristics memory)
  (AE sensor limit level setting)
  (Auto exposure copy mode copy quality adjustment)

### V. Problems caused by improper adjustment

- If the AE sensor input level is not properly adjusted, the following troubles may occur.

  ☆ Insufficient copy density (Only in the full color auto photo copy mode, or black-and-white graphic auto copy mode)

  ☆ Background is copied. (Only in full color photo auto copy mode or black-and-white graphic auto copy mode)

  ☆ Poor gradation of copy. (Only in full color photo auto copy mode)

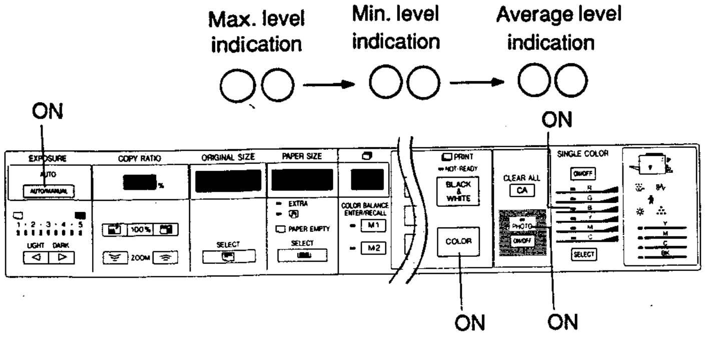
  ☆ Poor or excessively strong copy contrast (Only in full color photo auto copy mode)

### VI. Adjustment procedures

① Set two or three A3 (11" x 17") white papers on the original table.

② Perform test command 55.
(C → 0 → 0 → C → 5 → 5 → COLOR PSW)

- The copy lamp lights up, the mirror base scans, and the maximum, the minimum, and the average values of the AE sensor output level are shown in this sequence in the copy quantity display.



③ Adjust VR201 on the slave PWB so that the AE sensor level average is 60±1.
To perform the above procedure again, depress the COLOR PSW again.

④ Depress the clear key twice to clear test command 55.

## (10) AE sensor output characteristics memory

### I. General/purpose

The AE sensor output characteristics memory is performed with test command 47.
This operation is to store the AE sensor output characteristics for the copy lamp applying voltage in the memory.
This data is used to determine the copy lamp applying voltage in the black-and-white graphic auto copy mode.
This operation is required to correct variation in the AE sensor output for the copy lamp applying voltage caused by variation in the AE sensor light path in each set.

### II. The AE sensor output characteristic memory should be performed in the following cases:

- When mirror base A is disassembled.
- When the copy lamp reflector is replaced or cleaned.
- When the exposure control plate position is changed. (When uniformity adjustment is performed.)
- When the AE sensor is replaced.
- When the copy lamp is replaced.
- When the slave PWB is replaced.
- When VR 201 on the slave PWB is replaced.
- When the main PWB is replaced.
- When the RAM (IC144, 145) in the main PWB is replaced.
- When maintenance is performed.
- When black-and-white graphic auto copy mode copy quality adjustment is performed.
- When self diagnosis U2 trouble is eliminated.

### III. Note

- When the AE sensor output characteristics memory is made, the black-and-white auto copy mode copy quality adjustment should must be performed.
- When U3 error indication is displayed in the copy quantity display during execution of test command 47, check for the following troubles, and perform the AE sensor output characteristics memory again.

  ☆ The original paper is not properly set.

  ☆ Improper adjustment of the AE sensor output level

  ☆ Defective AE sensor

  ☆ Damaged harness between the AE sensor and slave PWB's

  ☆ Defective CLC PWB

  ☆ Improper adjustment of CLC PWB

  ☆ Defective copy lamp

  ☆ Main PWB trouble

(If the relationship between the copy lamp applying voltage and the AE sensor output is abnormal, U3 status code is issued. To cancel U3 error, depress the clear key.)

### IV. Problems caused by improper adjustment

- Insufficient copy density (Only in the black-and-white graphic auto copy mode)
- Background is copied. (Only in the black-and-white graphic auto copy mode)
- The AE sensor output characteristics memory should be performed after the completion of the AE sensor input level adjustment.

### V. AE sensor output characteristics memory procedure

① Set two or three A3 (11" x 17") white papers on the original table.

Use of the white part of the document cover is not allowed.

② Perform test command 47.
(C → 0 → 0 → C → 4 → 7 → COLOR PSW)

- The mirror base scans and the copy lamp applying voltage changes from 80V (160V) to 40V (80V) in 5V (10V) increment. The AE sensor output characteristics for the change in the copy lamp applying voltage (copy lamp light quantity) are memorized in the main PWB RAM. If the test command is performed normally, the display in the copy quantity display disappears.
- Values in ( ) are for 200V system.

③ Depress the clear key twice to clear test command 47.

## (11) AE sensor limit level setting

### I. General/purpose

This is to set the maximum and minimum limit levels to the AE sensor to optimize the auto exposure operation. Thus the optimized density and contrast color balance are obtained in the full color graphic auto copy mode.
Test commands 55 and 52 are used for this setting.

### II. The AE sensor limit level setting should be performed in the following cases:

- When mirror base A is disassembled.
- When the copy lamp reflector is replaced or cleaned.
- When the exposure control plate position is changed. (When uniformity adjustment is performed.)
- When the AE sensor is replaced.
- When the copy lamp is replaced.
- When the slave PWB is replaced.
- When VR 201 on the slave PWB is replaced.
- When the main PWB is replaced.
- When the RAM (IC144, 145) in the main PWB is replaced.
- When maintenance is performed.
- When self diagnosis U2 trouble is eliminated.
- When the full color graphic auto copy mode copy quality adjustment is performed.

### III. Note

- After performing the AE sensor limit level setting, the following items should be performed.
- The full color graphic auto copy mode copy quality adjustment
- Before performing the AE sensor limit level setting, the following items must have been completed. If not, normal copy quality would not be obtained.
  Uniformity adjustment
  AE sensor input level adjustment

### IV. Problem caused by improper adjustment

- Poor copy density (only in the full color graphic auto copy mode)
- Background is copied (only in the full color graphic auto copy mode).
- Poor copy gradation (only in the full color graphic auto copy mode).
- Too strong or too weak copy contrast (only in the full color graphic auto copy mode).

### V. Setting procedures

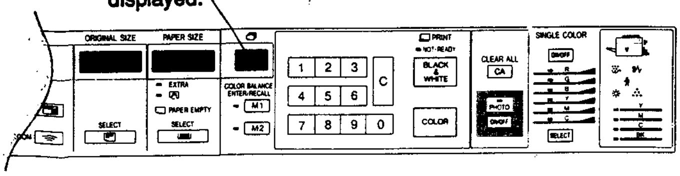
① Open the document cover, and keep it open. (Same state as when a black document is set.)

② Execute test command 55. (C → 0 → 0 → C → 5 → 5 → COLOR PSW)

- The copy lamp turns on and the mirror base scans. The AE sensor output levels are displayed in the copy quantity indication in the sequence of the maximum, the minimum, and the average level.

Max. level indication — Min. level indication — Average level indication

OO → OO → OO

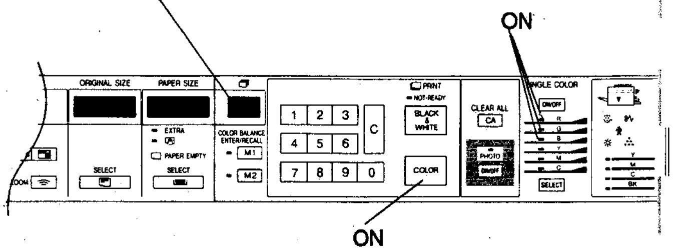

The previously set value of the AE sensor max. limit level is displayed.

③ Memorize the average AE sensor output level. To perform test command 55 again, push the COLOR PSW again.

④ Push the clear key twice to terminate test command 55.

⑤ Execute test command 52. (C → 0 → 0 → C → 5 → 2 → Color PSW)

- The color copy ready lamp turns on.
- The monochrome red, green, and blue lamps turn on.
- The previously set value of the AE sensor maximum output level is displayed in the copy quantity indicator.

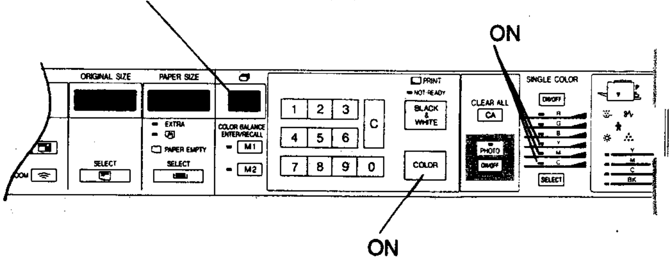

The previously set value of the AE sensor minimum limit level is displayed.

⑥ Enter 51 with the numeric key.
(The AE sensor maximum limit level is set to 51.)

- The entered value (51) is displayed in the copy quantity indicator.

⑦ Depress the COLOR PSW.

- The color copy ready lamp turns on.
- The monochrome yellow, magenta, and cyan lamps turn on.
- The value in step ⑥ is set.
- The previously set value of the AE sensor minimum limit level is displayed in the copy quantity indicator.


ON when the manual feed paper detector (PPD1) is active.

⑧ Enter the value (the average level in procedure ③ plus 3) using the numeric key.
(AE sensor output average level + 3 = AE sensor min. limit level set value)

- The entered value of the AE sensor minimum limit level is displayed in the copy quantity indicator.

⑨ Depress the COLOR PSW.

- The value in step ⑧ is set.

⑩ Depress the clear key switch twice to terminate test command 52. (To perform setting again, repeat procedures ⑤ through ⑩.)

## (12) Screen position adjustment

### I. General

The adjustment is to properly position the PC belt and the screen.

Standard gap between the PC belt and the screen is 1.7mm.

### II. Purpose

The purpose of the adjustment is to optimize the color balance and density balance of the copy in the photo copy mode.

### III. Tools required for adjustment

- Plus screwdriver
- Hex wrench

### IV. Note

- Do not scratch the screen and keep it clean.
- When disassembling or assembling the blank lamp/screen unit, be sure to reset the screen in advance.

### V. Problem caused by improper adjustment

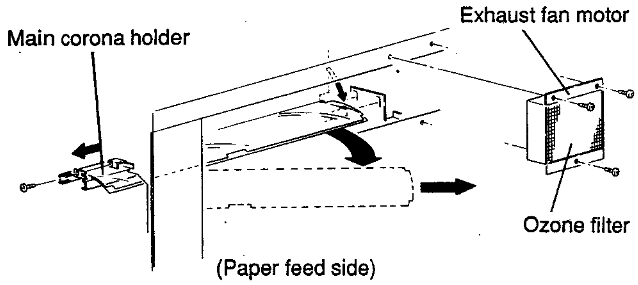
- Defective color balance/density balance in the photo copy mode
- Screen damage

### VI. Adjustment procedures

① Remove the right side cabinet.

② Remove the paper feed side exhaust fan motor (EFM) and the ozone filter.

③ Open the front cabinet and remove the main corona holder as shown below:

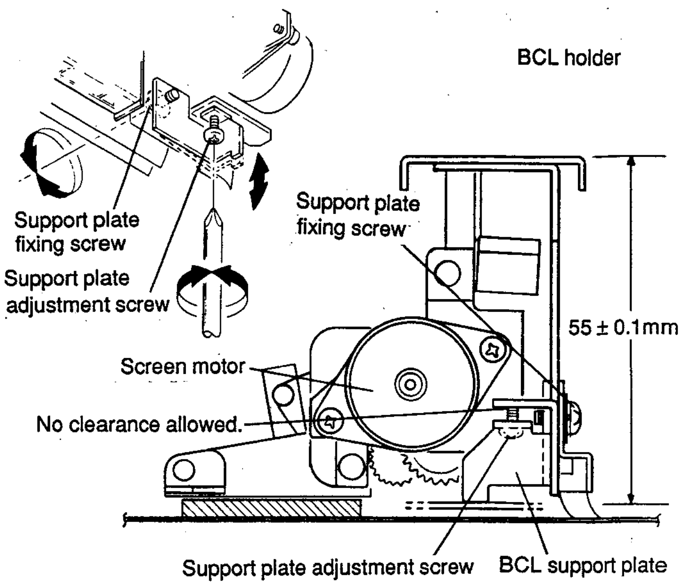

Main corona holder
Exhaust fan motor
Ozone filter
(Paper feed side)

④ Remove the blank lamp/screen unit from the copier body. (Refer to 9-17.)

Note: When removing the blank lamp/screen unit, set the screen in advance.

⑤ Check that the distance between the BCL holder and the BCL support plate edge is 55±0.1mm as shown below:

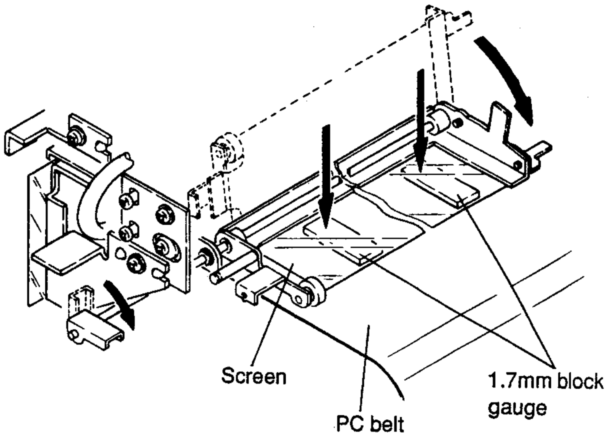
- If the distance is not 55±0.1mm, loosen the support plate fixing screw and adjust with the support plate adjustment screw. At that time, check that there is no clearance between


BCL holder
Support plate fixing screw
Support plate fixing screw
Support plate adjustment screw
55 ± 0.1mm
Screen motor
No clearance allowed.
Support plate adjustment screw
BCL support plate

IMPORTANT: If the distance exceeds 55.5mm, insertion of the blank lamp/screen unit into the copier may bend the part.

⑥ Insert the blank lamp/screen unit into the copier.

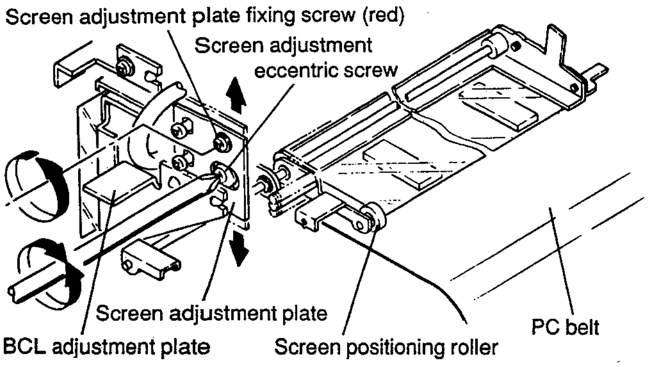
⑦ Check the balance between the screen and the PC belt.


Screen
PC belt
1.7mm block gauge

- Put a block gauge on the PC belt so that it comes in the paper exit side. Then tilt the screen and push the screen with fingers to check that there is no clearance between the screen and the block gauge.
- If there is any clearance between the block gauge and the screen, adjust as follows:

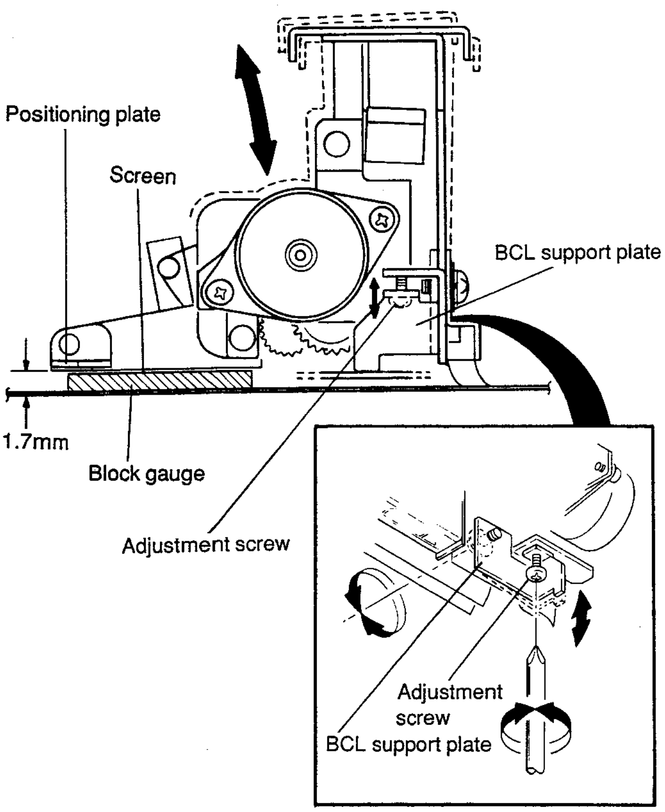
(Front frame side)

- Loosen the screen adjustment plate fixing screw (red) and turn the screen adjustment eccentric screw to adjust the screen adjustment plate up and down.
- If there is any clearance between the screen and the block gauge, move down the screen adjustment plate. If the screen positioning roller is pushed up by the block gauge, move down the screen adjustment plate. (The adjustable length is 1mm up and down.)


Screen adjustment plate fixing screw (red)
Screen adjustment eccentric screw
Screen adjustment plate
BCL adjustment plate
Screen positioning roller
PC belt

(Rear frame side)

⑤ Move the BCL support plate up and down to adjust.


Positioning plate
Screen
BCL support plate
1.7mm
Block gauge
Adjustment screw
Adjustment screw
BCL support plate

- If there is any clearance between the screen and the block gauge, loosen the adjustment screw to move up the support plate.
  When the screen is pushed up by the block gauge, adjust in the opposite direction.

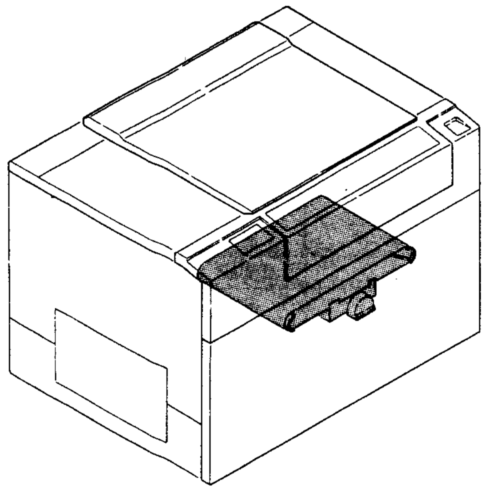
Note: When using the block gauge to adjust the screen, be careful not to scratch the PC belt. It is advisable to temporarily replace the PC belt with an old one for adjustment. When an old PC belt is not available, adjust with the junction section (non image area) of the PC belt.

⑧ After completion of the screen position adjustment, use the gray scale to adjust the photo mode uniformity.
If the exposure balance in half tone is improper, repeat procedures ⑦ and ⑧.

Note: Before adjusting the screen uniformity, the optical system uniformity must be performed.

(Note) • If the screen positioning roller is separated from the photoconductor belt, though LR = LF, the adjustment is required.

# [9] PC BLOCK



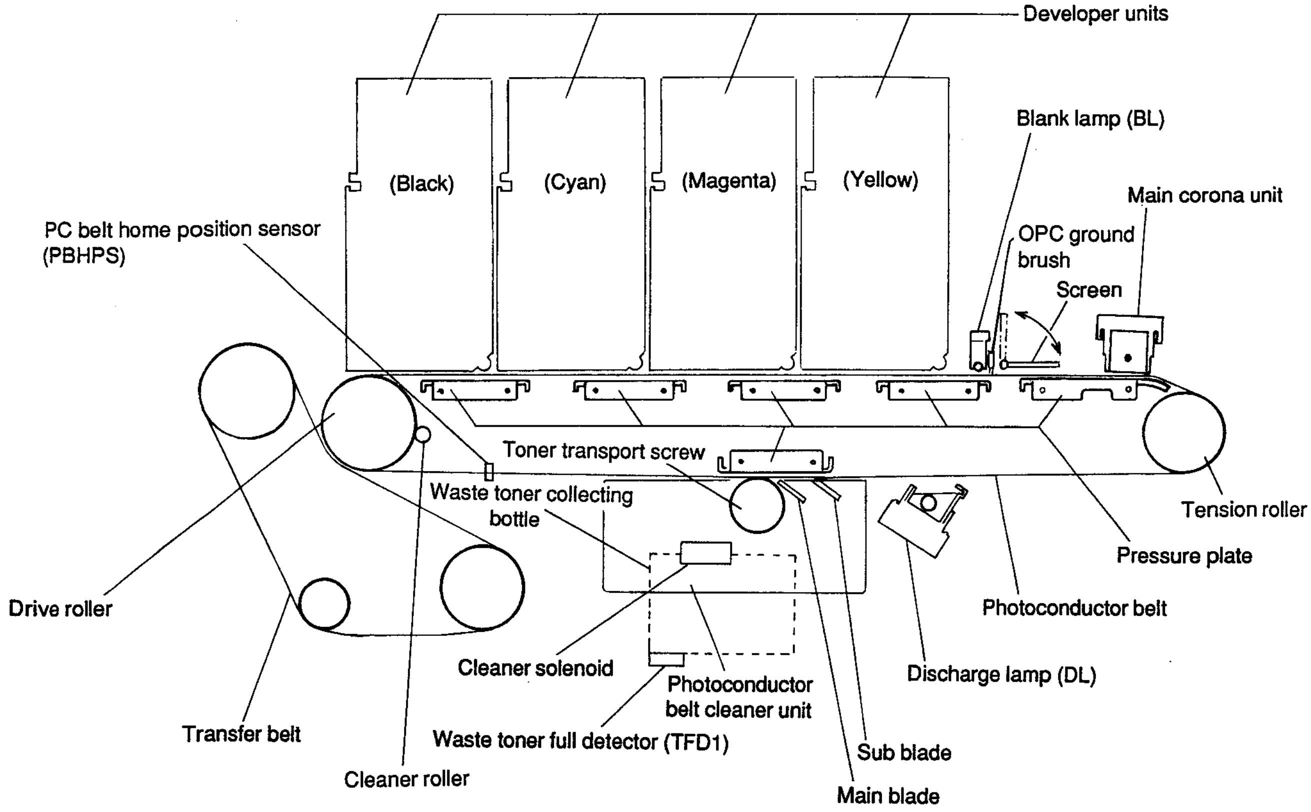
## 1. GENERAL

The photoconductor block is composed of the photoconductor belt, the photoconductor belt drive unit, the main corona, the photoconductor belt cleaner, the blank lamp, and the discharge lamp.
This block accepts exposure light from No. 5 mirror to the photoconductor belt to form an electrostatic latent image.

## 2. SPECIFICATIONS

- PC: OPC belt
- Charging method: negative DC scorotron
- Discharging method: Discharge lamp method
- PC belt cleaning: Double blade method
- Process speed: 184 mm/sec
- PC surface voltage control: Controlled by the corona grid voltage

## 3. Construction (Parts names)


Developer units
(Black)
(Cyan)
(Magenta)
(Yellow)
Blank lamp (BL)
Main corona unit
OPC ground brush
Screen
PC belt home position sensor (PBHPS)
Toner transport screw
Waste toner collecting bottle
Tension roller
Pressure plate
Photoconductor belt
Drive roller
Cleaner solenoid
Photoconductor belt cleaner unit
Discharge lamp (DL)
Transfer belt
Waste toner full detector (TFD1)
Sub blade
Cleaner roller
Main blade

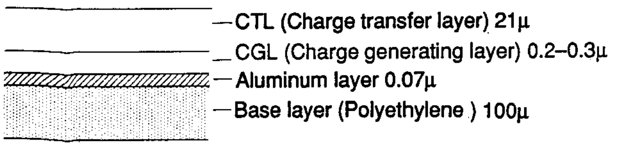
## 4. Major parts and functions

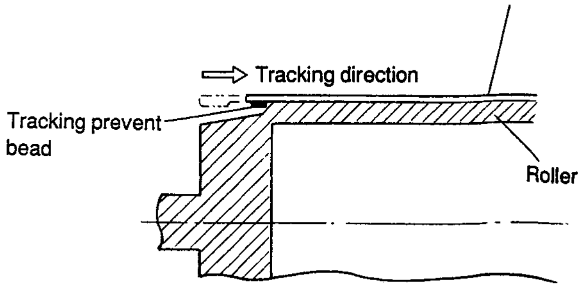
### (1) PC belt

OPC is used as the photoconductor.

Light image is transformed into an electrostatic latent image.
A cilicon rubber bead is provided inside the photoconductor belt to prevent tracking error.

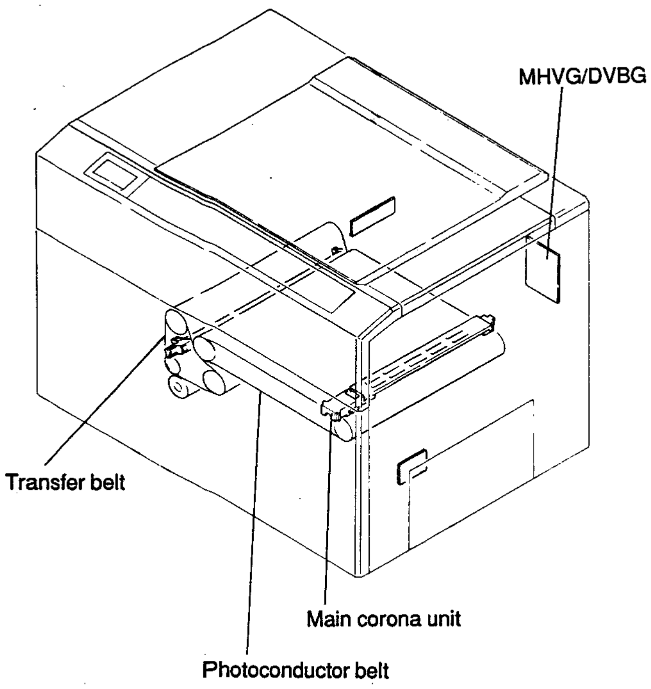
(OPC construction)


CTL (Charge transfer layer) 21µ
CGL (Charge generating layer) 0.2–0.3µ
Aluminum layer 0.07µ
Base layer (Polyethylene ) 100µ


Tracking direction
Tracking prevent bead
Roller

## (2) Main corona unit

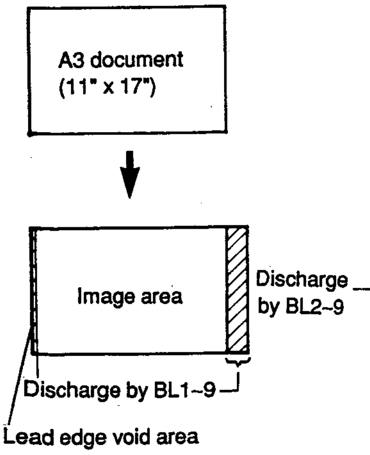
Used to apply a uniform negative charge on the surface of the photoconductor belt by the negative scorotron discharge.
A screen grid is provided to control the surface potential.
The grid voltage is automatically determined by gamma correction, and is driven by the MHVG.


MHVG/DVBG
Transfer belt
Main corona unit
Photoconductor belt

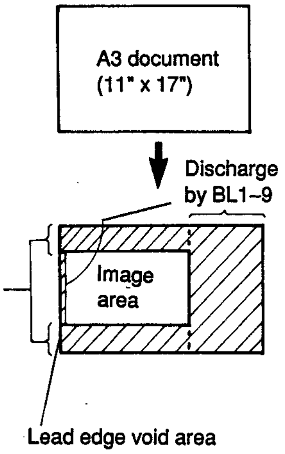
## (3) Blank lamp

LED's are used as the lamp elements.
Used to discharge non-image areas of the OPC belt to prevent development.
It is driven by the main PWB.
The lead edge void area can be controlled by changing the blank lamp OFF timing with test command 58.

(Normal)


A3 document
(11" x 17")
Image area
Discharge by BL2~9
Discharge by BL1~9
Lead edge void area

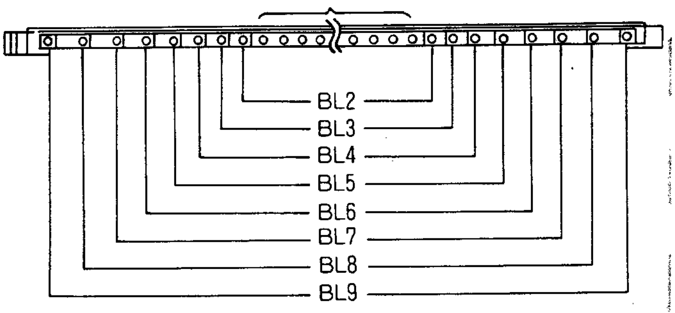
(Reduction)


A3 document
(11" x 17")
Discharge by BL1~9
Image area
Lead edge void area

**(Copy magnification ratio and blank lamp lighting)**

| Copy magnification ratio | Lamp name | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AB series | BL2 | BL3 | BL4 | BL5 | BL6 | BL7 | BL8 | BL9 |
| 0.93~1.54 | × | × | × | × | × | × | × | O |
| 0.87~0.92 | × | × | × | × | × | × | O | O |
| 0.81~0.86 | × | × | × | × | × | O | O | O |
| 0.76~0.80 | × | × | × | × | O | O | O | O |
| 0.71~0.75 | × | × | × | O | O | O | O | O |
| 0.67~0.70 | × | × | O | O | O | O | O | O |
| 0.64~0.66 | × | O | O | O | O | O | O | O |
| Inch series | BL2 | BL3 | BL4 | BL5 | BL6 | BL7 | BL8 | BL9 |
| 0.96~1.54 | × | × | × | × | × | × | × | O |
| 0.91~0.94 | × | × | × | × | × | × | O | O |
| 0.85~0.90 | × | × | × | × | × | O | O | O |
| 0.79~0.84 | × | × | × | × | O | O | O | O |
| 0.74~0.78 | × | × | × | O | O | O | O | O |
| 0.69~0.73 | × | × | O | O | O | O | O | O |
| 0.64~0.68 | × | O | O | O | O | O | O | O |

Note (O-ON/X-OFF)


BL1
BL2
BL3
BL4
BL5
BL6
BL7
BL8
BL9

## (4) Pre-transfer discharge lamp

Used to project light to partially discharge the negative charge on the photoconductor belt surface, thereby weakening the attractive force of the toner to the photoconductor belt for better transfer of image to the TX belt.
Driven by the main PWB.

## (5) PC belt cleaner unit

Used to remove residual toner from the photoconductor belt.
It's major components are the main blade, sub blade, toner seal, toner transport roller, cleaner solenoid.

### a. Main blade

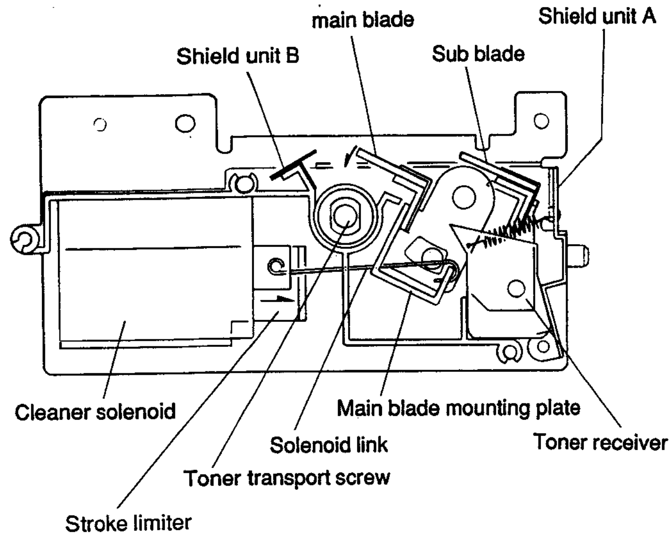
The main blade is used to clean the sections other than the belt seam area of the photoconductor belt.
It is brought into contact or out of contact with the photoconductor belt by on-off action of the cleaner solenoid. When the photoconductor seam approaches the main blade, the cleaner solenoid is de-energized, thereby removing the main cleaner blade from the OPC surface.
Toner removed by the main blade is sent to the waste toner collection container by the toner transport roller.

### b. Sub blade

The sub blade is always in contact with the photoconductor belt and is used to clean the photoconductor belt seam area and any sections which are not cleaned by the main blade.
Toner removed by the sub blade is collected in the toner receiver.

### c. Cleaner solenoid

Used to drive the main blade. It is driven by the main PWB.



### d. Shield units

There are four shield units, which prevent toner scatter from the cleaner unit.

- Shield unit A
  Shield unit A prevents toner scatter from the right side of the cleaner unit. Composed of a shield unit frame, sheet, and cushion.
- Shield unit B
  Shield unit B prevents toner scatter from the left side of the cleaner unit. Composed of a shield unit frame and sheet.
- Shield unit F
  Shield unit F prevents toner scatter from the front frame side. Composed of a shield unit plate, sheet, and felt. (Not shown)
- Shield unit R
  Shield unit R prevents toner scatter from the rear frame side. Composed of a shield unit plate, sheet, and felt. (Not shown)

### e. Toner transport screw

Used to transport toner inside the cleaner unit to the waste toner bottle.

## (6) PC belt drive unit

The photoconductor belt drive unit is composed of the drive roller, tension roller, PC motor, PC motor control PWB, and pressure plates.

### a. Drive roller

Used to rotate the photoconductor belt.
The surface is coated with urethane rubber.

### b. Tension roller

Used to apply an even tension to the photoconductor belt. Tension can be applied or removed with the tension release lever.

The surface is coated with urethane rubber.

### c. PC motor

This is a 3-phase DC brushless servo motor used to rotate the photoconductor belt. It's speed is varied depending upon the copy mode selected.
It is driven by the PC motor control PWB.

### d. Pressure plate

Used to maintain the correct operating distance between the PC belt and the main corona unit, cleaner unit and DV units.

### e. Drive roller cleaner

## (7) Discharge lamp

Used to project light to the cleaned photoconductor belt to discharge residual charges.
A filament lamp is used.
It is driven by the main PWB.

## (8) PC belt home position sensor

A transmission photo sensor is used to detect the photoconductor belt home position.
The sensor output is sent to the main PWB.
The output signal of the sensor is used to syncronize the position of the photoconductor belt and the TX belt.

## (9) OPC ground brush

Attached to the screen/blank lamp unit, and is used to ground the PC belt. The brush fibers are in constant contact with the ground portion of the PC belt.

## (10) Waste toner full detector

Used to detect toner full state (about 300g) in the waste toner collection bottle.
A transmission photosensor is used. When toner full is detected, the detector level is LOW. The detector output is sent to the main PWB.

## (11) Waste toner collecting bottle

Used to receive waste toner transported from the photoconductor cleaner unit.

# 5. Major parts disassembly, assembly, replacement, and cleaning

## A. List

| Item No. | | Part name | | Replacement cycle | Cleaning | Ref. page |
|---|---|---|---|---|---|---|
| (1) | | Main corona unit | | | At every maintenance | 9-4 |
| | a | Corona wire | | At maintenance (every 40K scan) | At every maintenance | 9-4 |
| | b | Grid | | At maintenance (every 40K scan) | At every maintenance | 9-4 |
| (2) | | PC belt | | At maintenance (40K scan) | | 9-5 |
| (3) | | Discharge lamp unit | | | At every maintenance | 9-9 |
| (4) | | Blank lamp unit | AB series<br>Inch series | | At every maintenance | 9-9 |
| | a | Blank lamp | | | At every maintenance | 9-9 |
| | b | Shield unit | | At maintenance (every 120K scan) | At every maintenance | 9-9 |
| (5) | | PC belt cleaner unit | | | At every maintenance | 9-10 |
| | a | Main blade | | At maintenance (every 20K scan) | At every maintenance | 9-10 |
| | | Sub blade | | At maintenance (every 20K scan) | At every maintenance | |
| | b | Shield unit F | | At maintenance (every 120K scan) | At every maintenance | 9-10 |
| | | Shield unit R | | At maintenance (every 120K scan) | At every maintenance | |
| | c | Shield unit A | | At maintenance (every 120K scan) | At every maintenance | 9-11 |
| | d | Shield unit B | | At maintenance (every 120K scan) | At every maintenance | 9-11 |
| | e | Toner transport screw | | | | 9-12 |
| (6) | | PC belt drive unit | | | At every maintenance | 9-12 |
| | a | Drive roller<br>Tension roller<br>Pressure plate | | | At every maintenance | 9-13 |
| | b | Drive roller cleaner | | At maintenance (every 20K scan) | At every maintenance | 9-13 |
| (7) | | PC belt home position sensor | | | At every maintenance (every 20K scan) | 9-14 |
| (8) | | PC belt drive motor | | | | 9-14 |
| (9) | | Waste toner full sensor | | | At every maintenance | 9-14 |
| (10) | | MHVG/DVBG | | | | 9-15 |

## B. Procedure

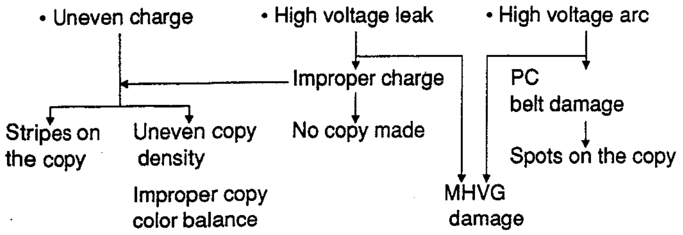
### (1) Main corona unit

### a. Main corona wire replacement and cleaning

I. Necessary tools

- Alcohol
- Cloth
- Plus screwdriver
- Corona wire
- Corona wire cleaner

II. Problem caused by improper procedure

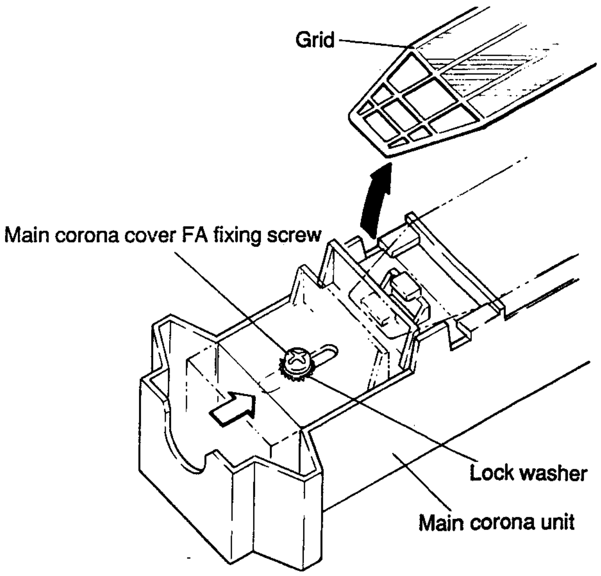

• Uneven charge
• High voltage leak
• High voltage arc
Improper charge
PC belt damage
Stripes on the copy
Uneven copy density
No copy made
Spots on the copy
Improper copy color balance
MHVG damage

III. Replacement/cleaning procedures

Removing the grid

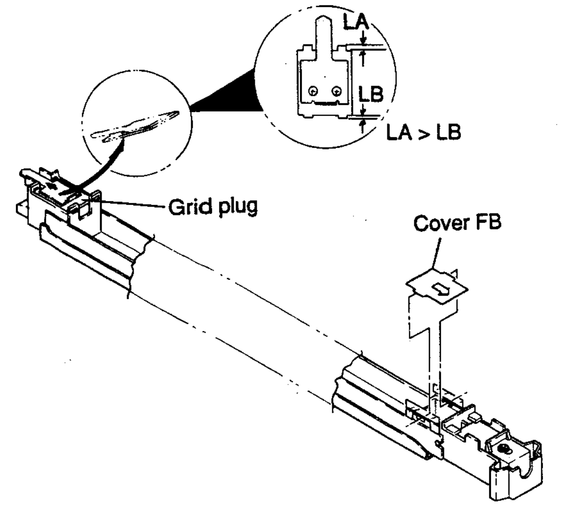
① Loosen the main corona cover FA fixing screw and remove the grid.

(Note) Be careful not to bend or scratch the screen grid.

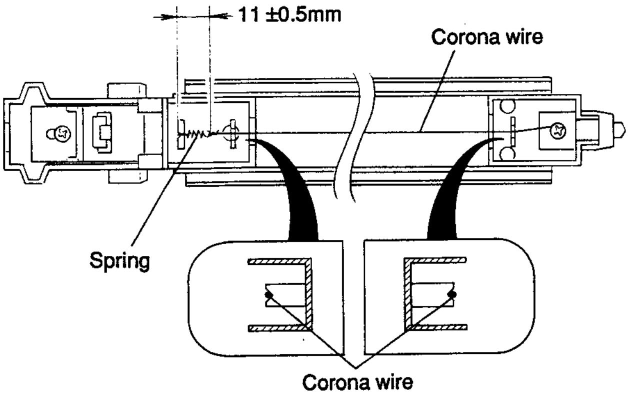

Grid
Main corona cover FA fixing screw
Lock washer
Main corona unit

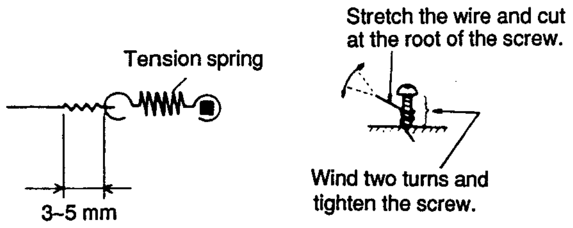
**Stretching and tensioning the wire**

① Remove the main corona cover FB and the grid plug.

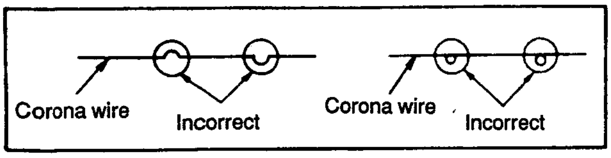

LA
LB
LA > LB
Grid plug
Cover FB

② Stretch the corona wire as shown in the figure below.


11 ±0.5mm
Corona wire
Spring
Corona wire


Tension spring
Stretch the wire and cut at the root of the screw.
3~5 mm
Wind two turns and tighten the screw.

(Note) Carefully eliminate distortion, slack or deformation in the corona wire.


Corona wire
Incorrect
Corona wire
Incorrect

- After replacement of the corona wire, be sure to clean with alcohol. (Use only alcohol.)

**Wire cleaning procedures**

Wet the corona cleaner with alcohol. Hold the main corona wire with the corona cleaner and slide the corona cleaner from the grid plug to the main corona cover FA.

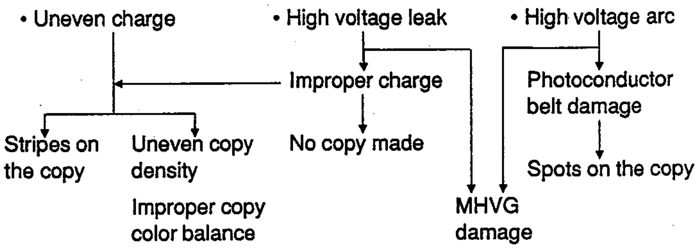
(Note) Do not slide in the opposite direction. Use only alcohol.

### b. Main corona grid replacement/cleaning

I. Necessary tools

- Alcohol
- Cloth
- Plus screwdriver

II. Problem caused by improper procedure


• Uneven charge
• High voltage leak
• High voltage arc
Improper charge
Photoconductor belt damage
Stripes on the copy
Uneven copy density
Improper copy color balance
No copy made
MHVG damage
Spots on the copy

III. Replacement/cleaning procedures

**Replacement procedures**

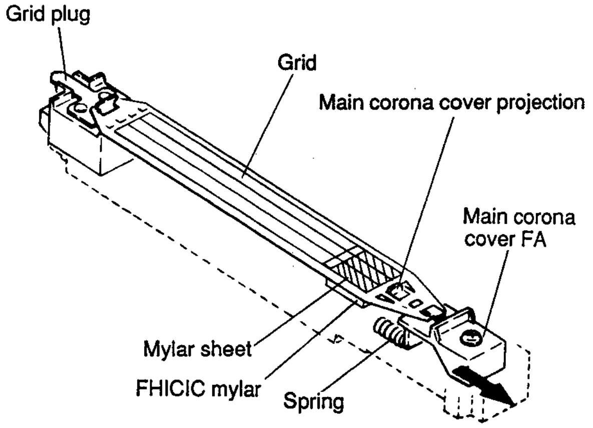
Refer to "a. Main corona wire".

**Cleaning**

Clean the both surfaces with cloth and alcohol. Be careful not to deform the grid.

**Installing the grid**

Hook the screen grid to the grid electrode on the rear frame side, then hook the front frame side to the main corona cover F and lightly stretch in the arrowhead so that the screen grid is taut.


Grid plug
Grid
Main corona cover projection
Main corona cover FA
Mylar sheet
FHICIC mylar
Spring

(Note) Note the installing direction of the screen grid. The side with the mylar sheet must face the PC belt.

## (2) PC belt replacement

### I. Necessary tools

- Plus screwdriver
- PC belt protection sheet (Required only when the removed PC belt is used again)
- TX belt protection sheet (Required only when the removed TX belt is used again.)
- TX belt insertion jig
- PC belt insertion jig

### II. Note

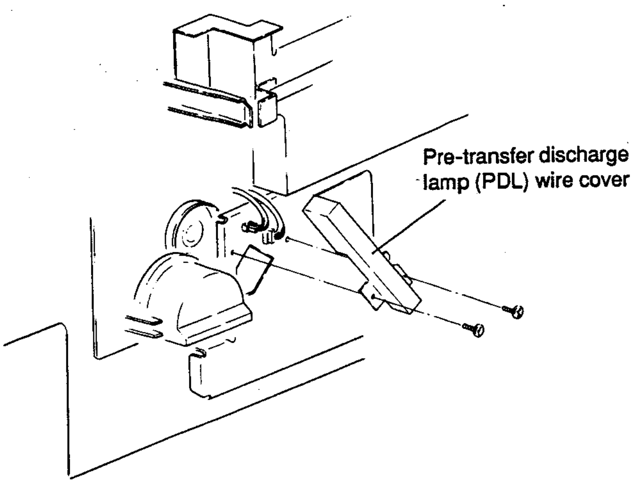
- Be sure to protect the PC belt from light if the PC belt is to be reused.
- Carefully prevent the PC belt from foreign material and scratches.
- After replacement of the PC belt, be sure to perform the PC belt sensitivity setting. (New belt)

## III. Replacement procedures

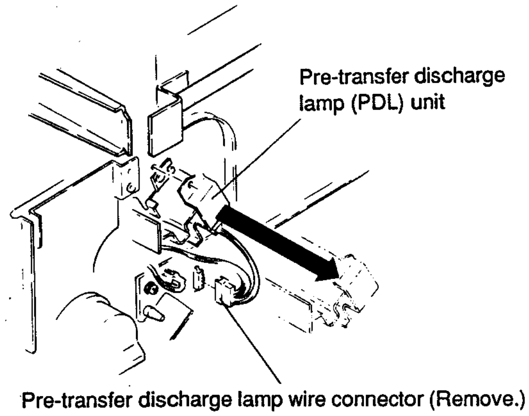
Replacement of the PC belt

① Remove the waste toner collecting container

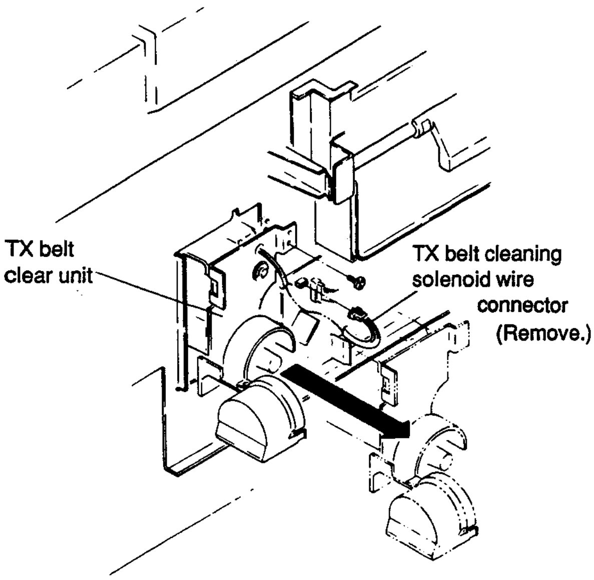
② Remove the pre-transfer discharge lamp (PDL) wire cover.


Pre-transfer discharge lamp (PDL) wire cover

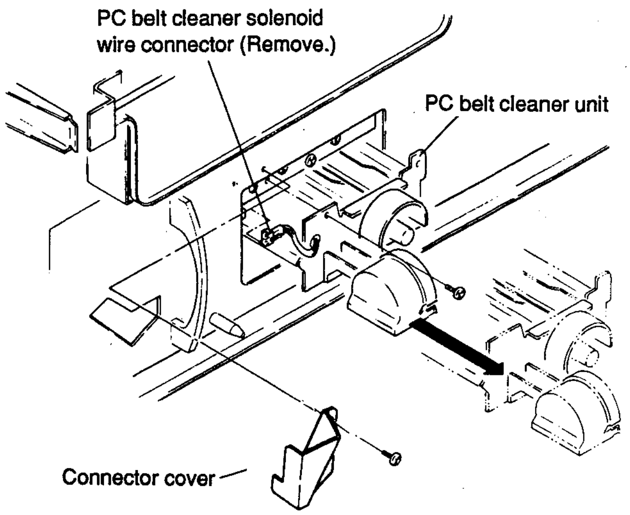
③ Remove the pre-TX discharge lamp unit (PDL).


Pre-transfer discharge lamp (PDL) unit
Pre-transfer discharge lamp wire connector (Remove.)

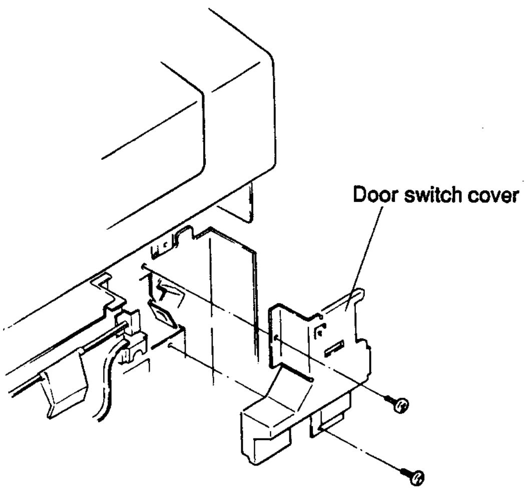
④ Remove the TX belt cleaner unit.


TX belt clear unit
TX belt cleaning solenoid wire connector (Remove.)

⑤ Remove the PC belt cleaner unit.

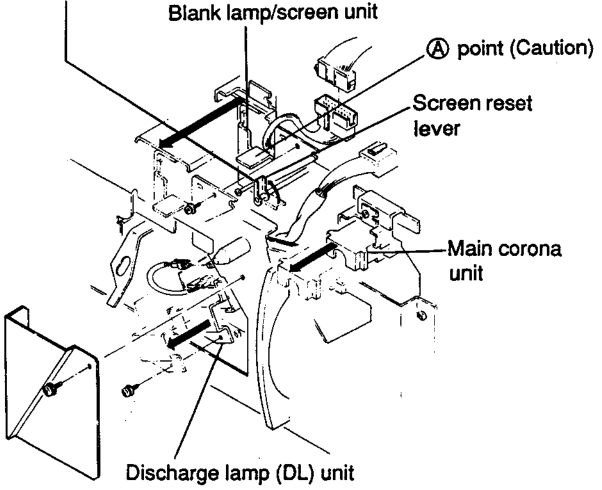

PC belt cleaner solenoid wire connector (Remove.)
PC belt cleaner unit
Connector cover

⑥ Remove the door switch cover.


Door switch cover

⑦ Remove the blank lamp/screen unit.

(Note) Before disassembling/assembling the blank lamp/scree unit, the screen should be reset to the (GR) mode.

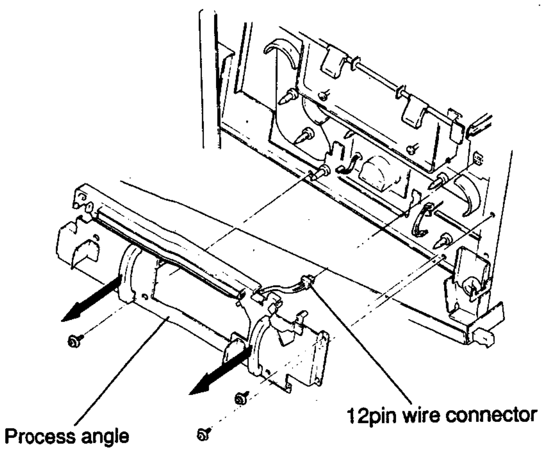

Blank lamp/screen unit
Ⓐ point (Caution)
Screen reset lever
Main corona unit
Discharge lamp (DL) unit

(Caution) Do not pull the Screen reset lever when remove the Screen unit. Hold a place of point Ⓐ then pull out the screen unit. If pull out unit by the screen reset lever, the screen plate may have major damage.

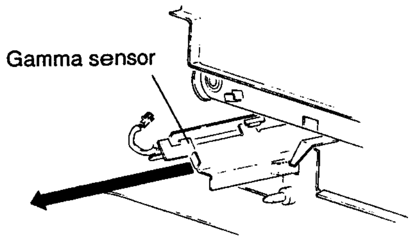
⑧ Remove the discharge lamp unit (DL).

⑨ Remove the main corona unit.

⑩ Remove the process angle.

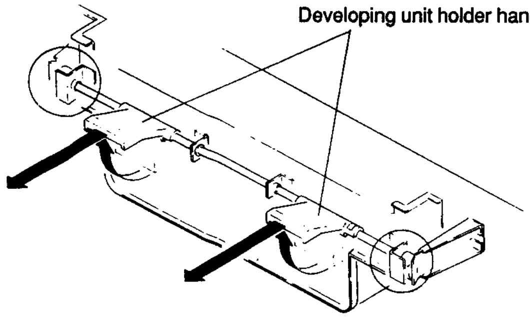

Process angle
12pin wire connector

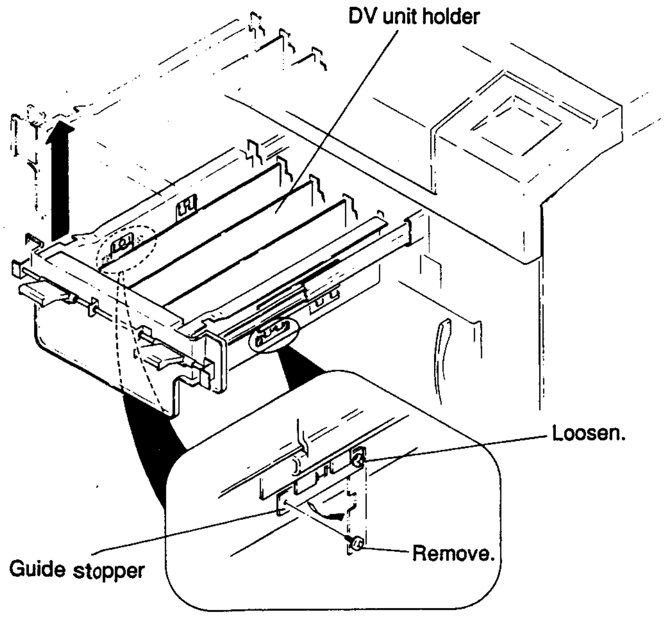
⑪ Remove the gamma sensor.


Gamma sensor

⑫ Remove the developing unit and the developing unit holder.

(Note) Place the developing units on paper to protect the MG roller from the foreign material.


Developing unit holder handle

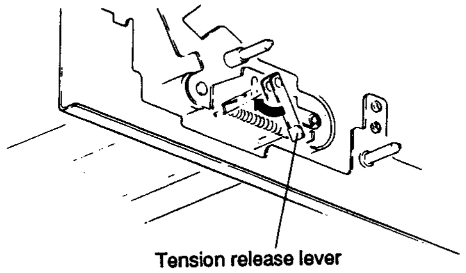

DV unit holder
Loosen.
Guide stopper
Remove.

⑬ Open the clamshell

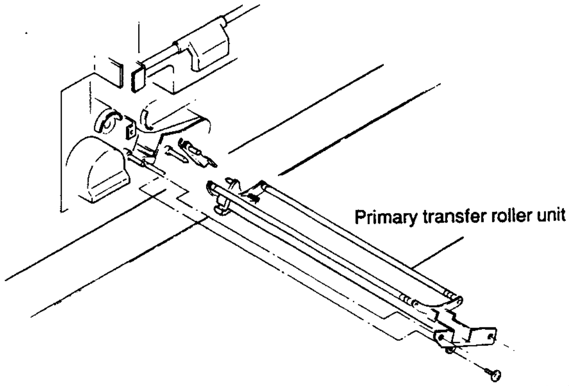
(Note) "Without DV unit." Caution should be taken when opening the clamshell due to reduced weight of upper unit; therefore apply and gradually release the clamshell.

⑭ Remove the TX belt

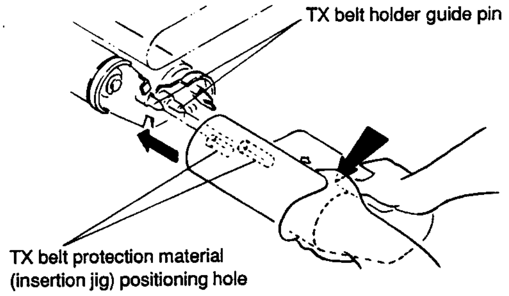
(Release the TX belt tension.)


Tension release lever

(Remove the primary transfer roller.)

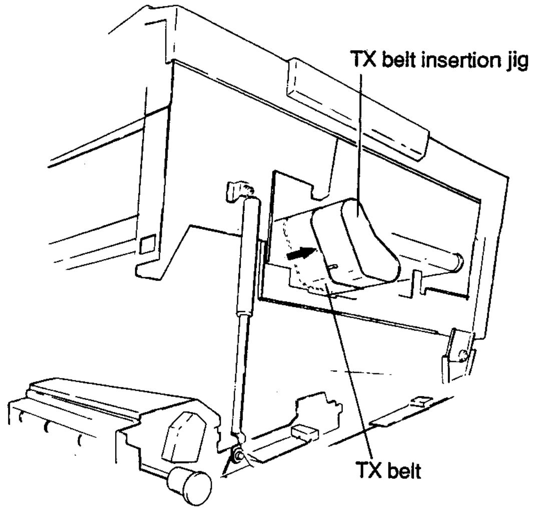

Primary transfer roller unit

(Fit the TX belt insertion jig positioning hole with the TX belt holder guide pin.)


TX belt holder guide pin
TX belt protection material
(insertion jig) positioning hole

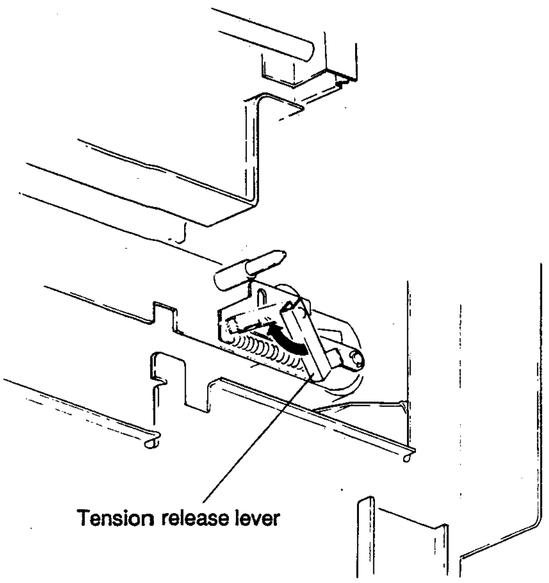
(Hold the TX belt end and pull it out so that the TX belt is positioned on the TX belt insertion jig.)

(Note) Be careful not to scratch the TX belt. Protect the TX belt from foreign materials.


TX belt insertion jig
TX belt

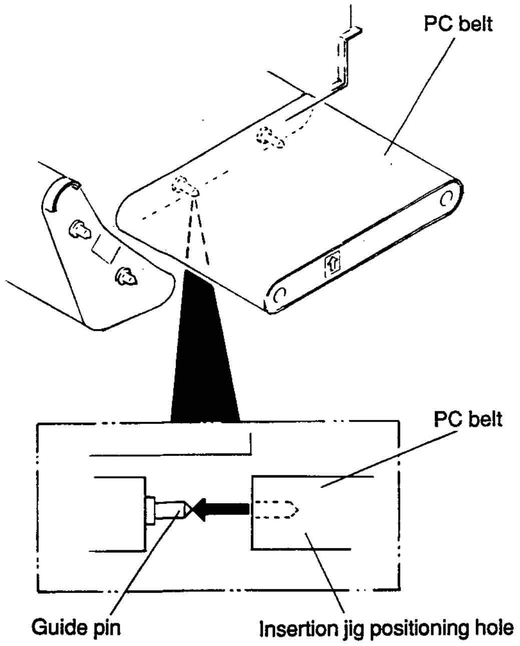
(With the TX belt stored on the TX belt insertion jig, cover the TX belt with the TX belt protection sheet.)

⑮ Release the PC belt tension.

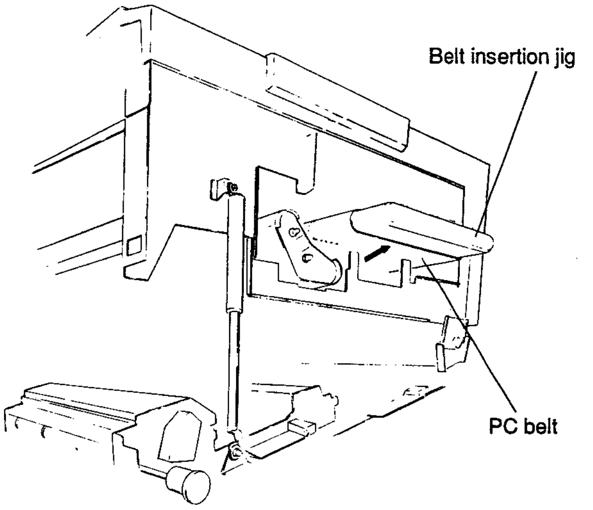

Tension release lever

⑯ Remove the PC belt.
(When the removed PC belt is used again, use the following procedures to remove the PC belt.)

(Fit the PC belt insertion jig positioning hole with the PC belt holder guide pin.)


PC belt
PC belt
Guide pin
Insertion jig positioning hole

(Hold the PC belt end and pull it out so that the PC belt is stored on the PC belt insertion jig.)


Belt insertion jig
PC belt

(When the removed PC belt is used again, with the PC belt stored on the PC belt insertion jig, cover the PC belt with the PC bel protection sheet.)

(Note) Carefully protect the TX belt from foreign materials and scratches.

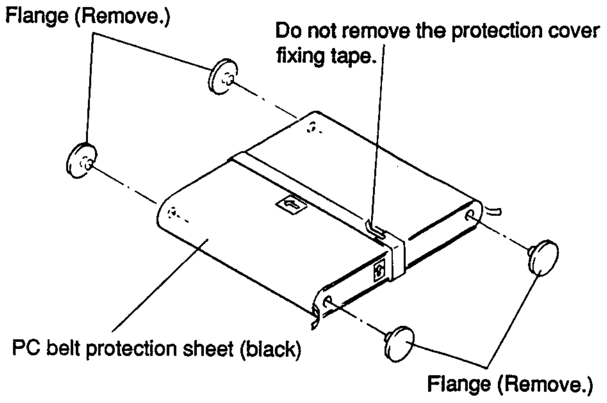
Installing the PC belt

Procedures ① and ② are for attaching a new PC belt, and are not required when a used one is reinstalled.

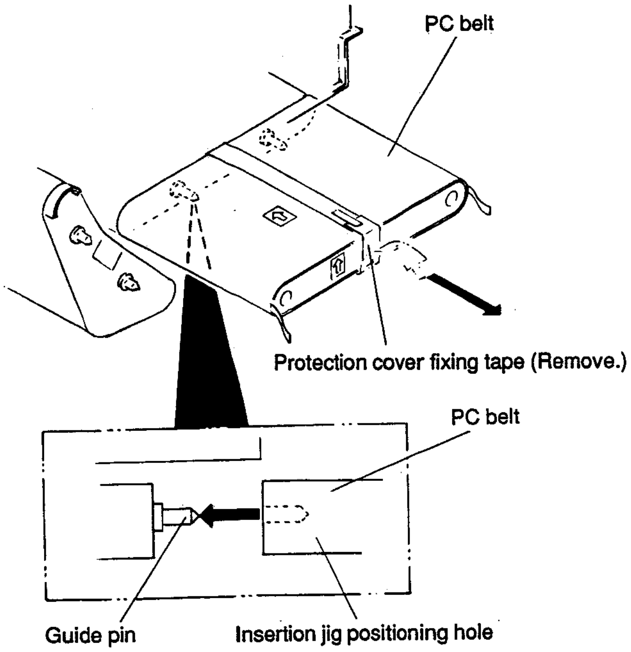
① Take a note of the PC belt sensitivity number printed on the packing case. The sensitivity number is the first figure of the PC belt serial number.

(Example) When the serial number is ②K8262B621, the sensitivity number is 2. ↑ Sensitivity number

② Remove the PC belt from the packing case, and remove the vinyl wrapping and the flanges. In this case, do not remove the protection cover fixing tape.

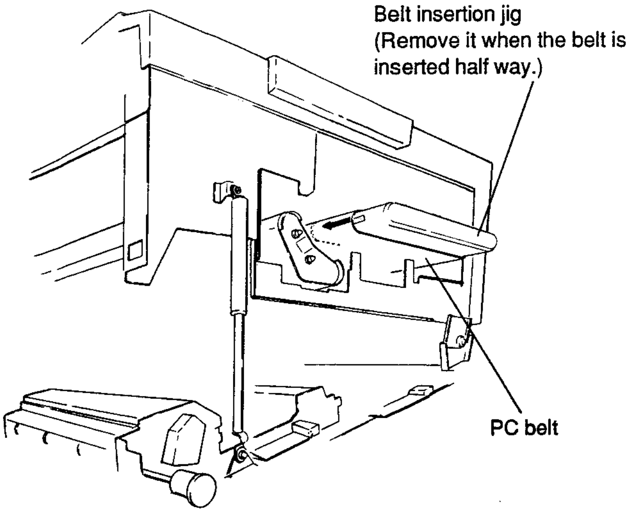

Flange (Remove.)
Do not remove the protection cover fixing tape.
PC belt protection sheet (black)
Flange (Remove.)

③ Fit the PC belt insertion jig positioning hole with the PC belt holde guide pin, and remove the protection cover fixing tape.


PC belt
Protection cover fixing tape (Remove.)
PC belt
Guide pin
Insertion jig positioning hole

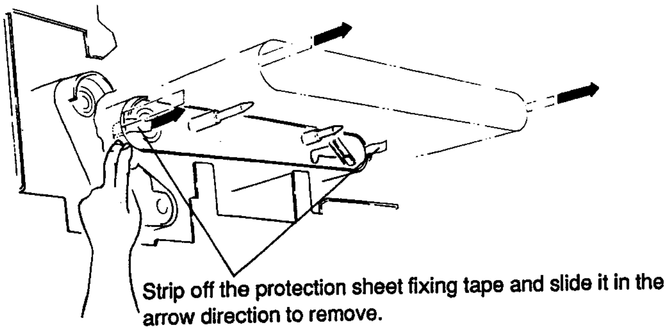
(Note) Be careful to install the PC belt in the proper direction so that the index hole and the carbon-coated surface are on the front frame side.

④ Slide the PC belt in the arrow direction half way, and remove the insertion jig. Then insert the PC belt until it makes contact with the PC belt holder.

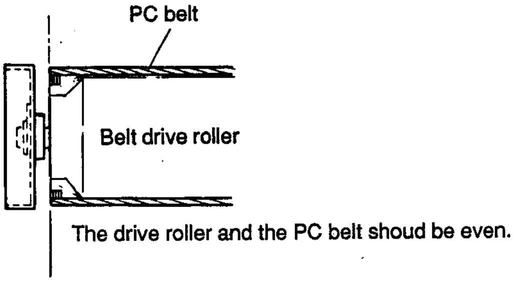

Belt insertion jig
(Remove it when the belt is inserted half way.)
PC belt

(Note) The PC belt is covered with a black protection sheet.

⑤ Hold the PC belt as shown and remove the black protection sheet from the PC belt, slide it in the arrow direction to remove the protection sheet.


Strip off the protection sheet fixing tape and slide it in the arrow direction to remove.

⑥ Slide and adjust the PC belt to the front or rear frame sides so that the front frame side PC belt end and the PC belt drive roller end are even.


PC belt
Belt drive roller
The drive roller and the PC belt shoud be even.

⑦ Turn the PC belt tension release lever counterclockwise and apply tension to the PC belt.

* Install the transfer belt after installing the PC belt. (Refer to 10-6.)

⑧ Closed the clain sheld and install the developing unit holder.

⑨ Install remain sub system units previously removed.

PC belt sensitivity setting

(See page 3-14.)

## (3) Discharge lamp unit cleaning (DL)

### I. Necessary tools

- Cloth

### II. Problem caused by improper procedure

- Poor discharge efficiency
  ↓
  Background on copies

### III. Cleaning procedure

Remove the discharge lamp unit. (Refer to page 9-6.)

Cleaning procedure

① Clean the lamp and filter with a cloth damp with water.

## (4) Blank lamp/screen unit

Blank lamp/screen unit removal

(See page 9-6.)

### a. Blank lamp cleaning

I. Necessary tools

- Cloth

II. Problems caused by improper procedure

| | |
|---|---|
| • A reduction in blank lamp discharge efficiency. | • Dirt on the screen |
| ↓ | ↓ |
| Background outside the copy image area. (Increased toner consumption.) | Improper copy color balance Background on copy (in photo mode.) |

III. Cleaning procedure

- Clean the blank lamp surface with a cloth dampened with water.

### b. Shield unit replacement/cleaning

I. Necessary tools

- Plus screwdriver
- Cloth

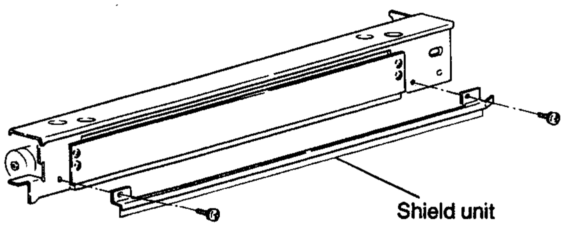
II. Problems caused by improper procedure

| | |
|---|---|
| • Toner scatter | • PC belt damage |
| ↓ | ↓ |
| Dirty copy | Stripes on copy |

III. Replacement/cleaning procedures

Replacement procedure

When replacing the sheet, replace the whole shield unit.



Cleaning procedure

Clean with dry cloth.

## (5) PC belt cleaner unit

PC belt cleaner unit removal

(Refer to page 9-6.)

### a. Replacement/cleaning of the main blade and sub blade

I. Necessary tools

- Cloth
- Plus screwdriver
- Vacuum cleaner

II. Note

- After replacement and cleaning of the main blade and sub blade, always execute test command 37 mode 3 to put toner on the PC belt then install the PC belt cleaner unit to the copier body. If this procedure is neglected, the cleaner blades may flip and cause PC dammage.

III. Problem caused by improper procedure

• Improper cleaning ← • Blade flip

Improper cleaning → Stripes on, Toner scatter

Toner scatter → Dirty copy

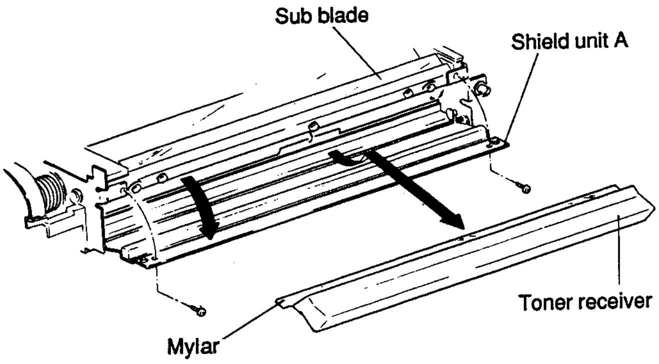
Blade flip → PC belt damage

IV. Replacement/cleaning procedure

Blade removal

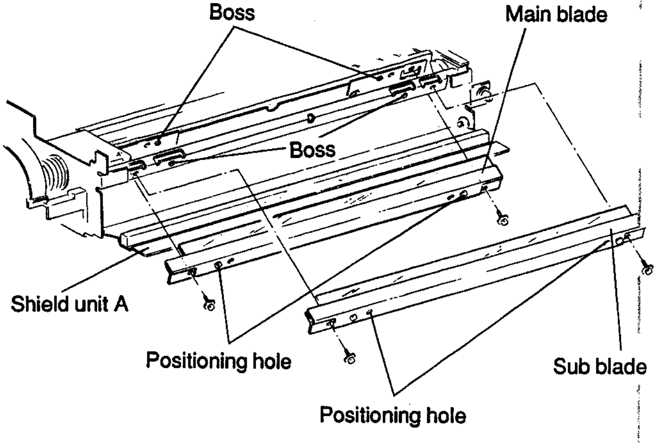
① Remove the shield unit A fixing screws (2 pcs.) and pull down shield unit A.

(Note) Be careful not to deform the shield sheet attached to shield unit A.



② Remove the toner receiver.

③ Remove the main blade and sub blade fixing screws (blue screw) and remove the main blade and sub blade.



(Note) Do not touch the red screw.

Blade installation

① Install a new main blade and sub blade.

(Note)
- Fit the blade positioning hole with the blade mounting plate boss.
- Do not remove the white powder on the blades. The white powder is to reduce friction between the PC belt and the blade, preventing the blade flip.
- The main blade and the sub blade are identical.

Applying toner to the PC belt

Toner is applied to the PC belt to reduce friction between the PC belt and the blade, preventing the blade flip.
Use test command 37 mode 3. (PC cleaner unit not installed)

This procedure should be executed in the following cases:

- When new blade is installed.
- When the PC belt cleaner unit is cleaned.
- When the PC belt cleaner unit is disassembled.

① Close the front exterior and turn on the power switch.

② Execute test command 37. (C → O → O → C → 3 → 7 → COLOR PSW)

- "1" is displayed on the copy quantity indicator.

③ Push numeric key 3.

- "3" is displayed on the copy quantity indicator.

④ Push the COLOR PSW.

- Toner is applied all over the PC belt surface.

PC belt cleaner unit installation

① Install the PC belt cleaner unit to the copier.

② Fasten cleaner solenoid connector.

③ Install the connector cover.

④ Install the waste toner collecting container.

Cleaning procedure

Clean the blades with a dry cloth.

(Note) After this procedure, use test command 37 to apply toner to the PC belt and install the PC belt cleaner unit into the copier.

### b. Replacement/cleaning of shield units F and R

I. Necessary tools

- Cloth
- Plus screwdriver
- Vacuum cleaner

II. Problem caused by improper procedure

- Toner scatter

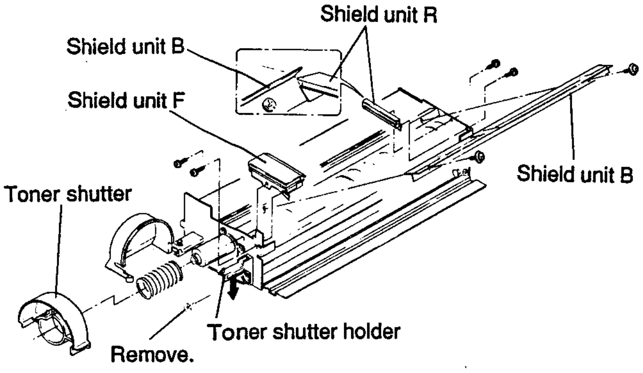
  ↓

  Dirty copy

III. Replacement/cleaning procedure

**Shield units F and R removal**

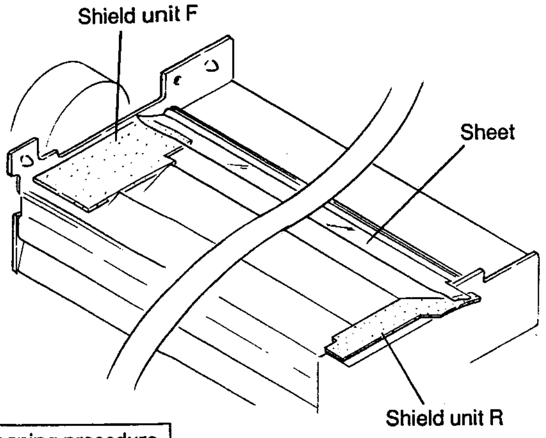
① Remove the toner shutter holder.


Shield unit R
Shield unit B
Shield unit F
Shield unit B
Toner shutter
Toner shutter holder
Remove.

② Remove shield unit F and shield unit R.

**Shield units F and R installation**

Install shield unit F and R as shown below:


Shield unit F
Sheet
Shield unit R

**Cleaning procedure**

Clean with a vacuum cleaner.

### c. Shield unit A replacement/cleaning

I. Necessary tools

- Cloth
- Plus screwdriver
- Vacuum cleaner

II. Note

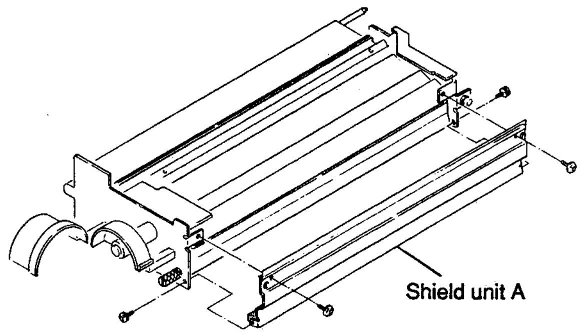
- The shield sheet attached to shield unit A should not be replaced in single part. Since the shield sheet cannot be attached properly in the field, replacement as an assembly is necessary.
- Be careful not to deform the shield sheet.

III. Problem caused by improper procedure

| | |
|---|---|
| • PC belt damage | • Toner scatter |
| ↓ | ↓ |
| Stripes on the copy | Dirty copy |

IV. Replacement/cleaning procedure

**Shield unit A removal**


Shield unit A

**Cleaning procedure**

Clean with a vacuum cleaner.

### d. Shield unit B replacement/cleaning

I. Necessary tools

- Cloth
- Plus screwdriver
- Vacuum cleaner

II. Note

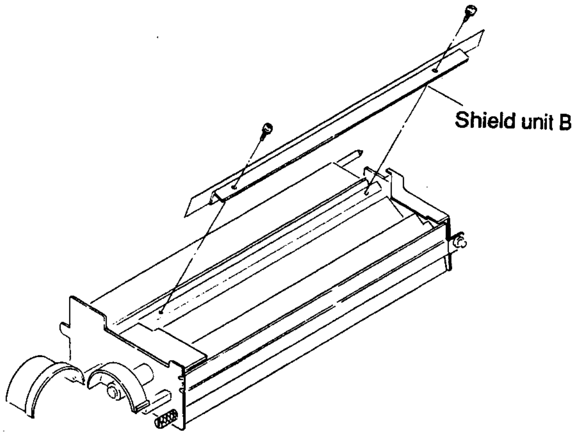
- The shield sheet attached to shield unit B should not be replaced as a single part. Since the shield sheet cannot be attached properly in the field, replacement as an assembly is necessary, replace it in a whole unit.
- Be careful not to deform the shield sheet.

III. Problems caused by improper procedure

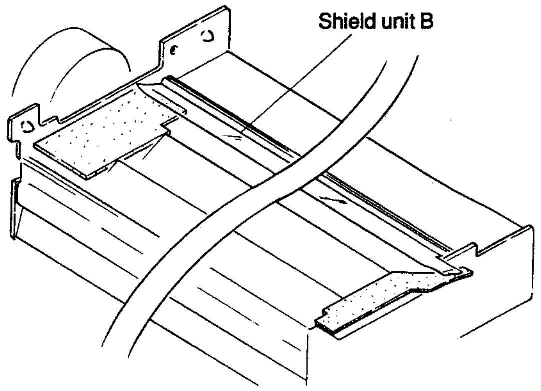
| | |
|---|---|
| • PC belt damage | • Toner scatter |
| ↓ | ↓ |
| Stripes on the copy | Dirty copy |

IV. Replacement/cleaning procedures

**Shield unit B removal**


Shield unit B

**Shield unit B installation**


Shield unit B

Cleaning procedure

Clean with a vacuum cleaner

### e. Replacement of the toner transport screw

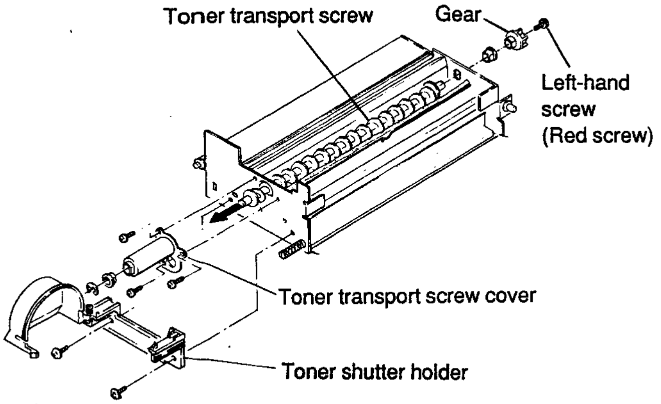
I. Necessary tools

- Cloth
- Vacuum cleaner
- Plus screwdriver

II. Replacing procedure

Removing the toner transport screw

① Remove the toner shutter holder.


Toner transport screw
Gear
Left-hand screw (Red screw)
Toner transport screw cover
Toner shutter holder

② Remove the toner transport screw cover.

③ Remove the toner transport screw drive gear.

(Note) Note that the toner transport screw drive gear fixing screw (red screw) is a left-hand thread.

④ Remove the toner transport screw from the front frame side.

### f. Developer removing magnet cleaning

I. Necessary tools

- Cloth
- Vacuum cleaner

II. Problems caused by improper procedures

- PC belt damage

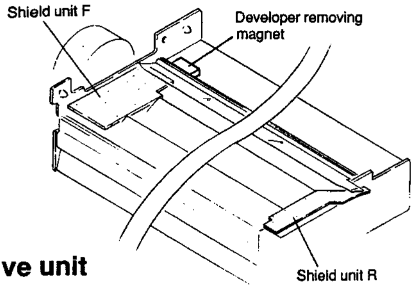
↓

- Index sensor error (L4-7)

III. Cleaning procedure

Developer removing magnet cleaning

① Remove developer from the developer removing magnet on the PC cleaner unit by using a vacuum cleaner.


Shield unit F
Developer removing magnet
Shield unit R

## (6) PC belt drive unit

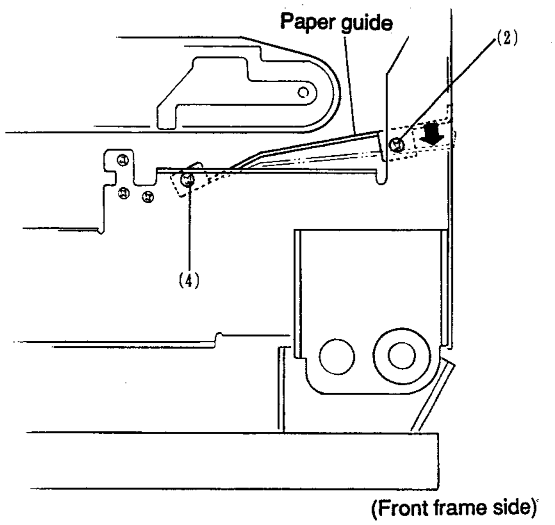
PC belt drive unit removal

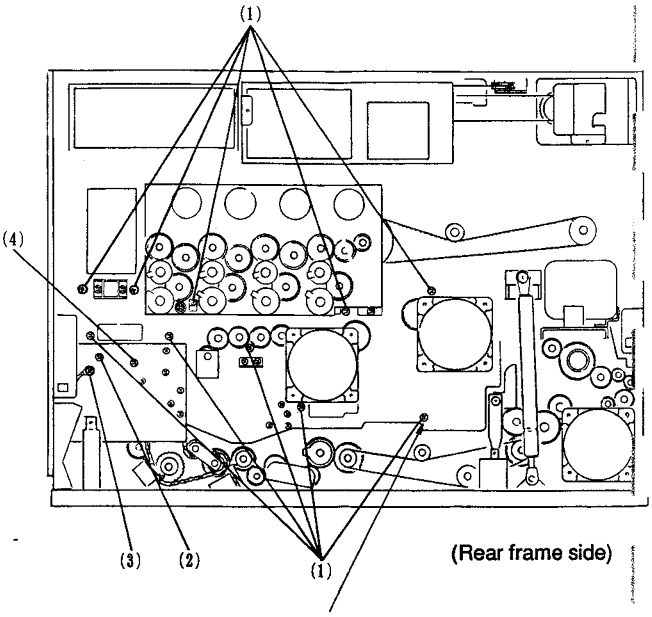
① Remove the PC belt (pre-transfer discharge lamp unit, discharge lamp unit, main corona unit, blank lamp/screen unit, TX belt, PC belt cleaner unit, TX belt cleaner unit, and gamma sensor.) (For details, refer to page 9-6.)

② Remove the rear exterior.

③ Remove the PWB holder with the PWB.

④ Remove the two paper guide fixing screws (2) and (3) and loosen two screws (4).

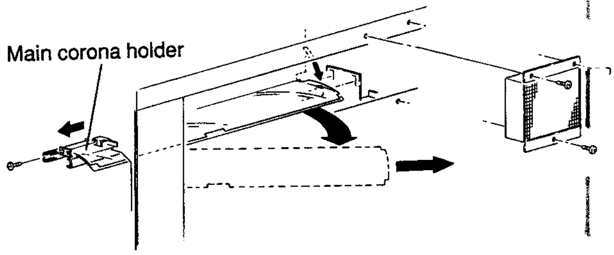

Paper guide
(2)
(4)
(Front frame side)


(1)
(4)
(3)
(2)
(1)
(Rear frame side)

(Note) Use a screw with 5mm washer. If a longer screw is used, the TX cleaner unit cannot be installed.

⑤ Lower the paper guide.

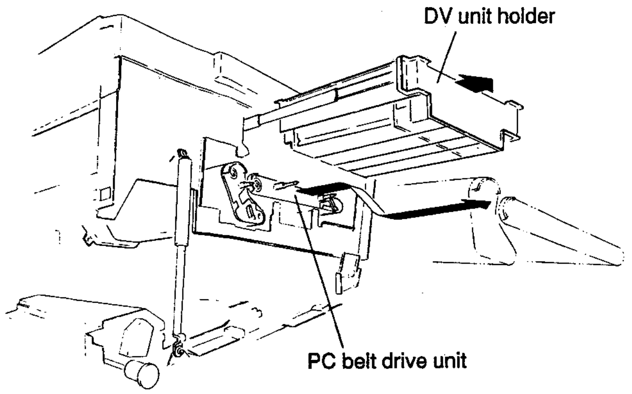
⑥ Remove the main corona holder


Main corona holder

⑦ Remove the manual paper holder.

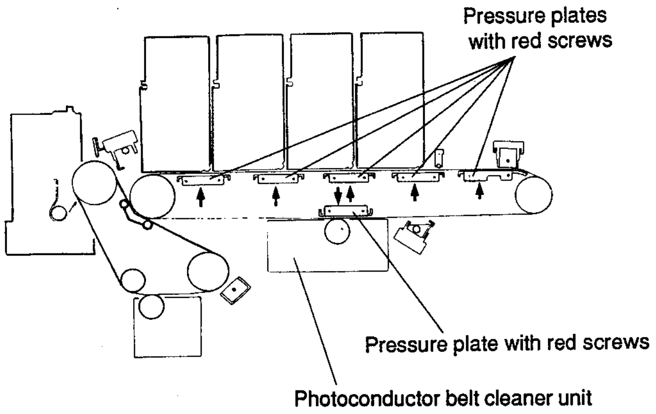
⑧ Remove the PC belt drive unit fixing screws (1) (10 pcs.)

⑨ Pull out the developing unit holder.



⑩ Remove the PC belt drive unit from the front frame side.
All pressure plate position should not adjusted or not removed. Red painted screws are adupted each pressure plate for this caution porpuse.

(Note) Neve attempt to adjust or remove the to 5 pressure plate or the cleaner unit pressure plate. These plate are installed with factory special tools, and fixed by all red screws.


Pressure plates with red screws
Pressure plate with red screws
Photoconductor belt cleaner unit

## a. Drive roller/tension roller/pressure plate cleaning

I. Necessary tools
  - Alcohol
  - Cloth
  - Plus screwdriver

II. Note
  - Do not scratch the rollers.
  - Use alcohol only. (Do not use other liquids.)
  - Carefully clean and remove all foreign materials.

III. Problem caused by improper procedure
  - Spots on copy

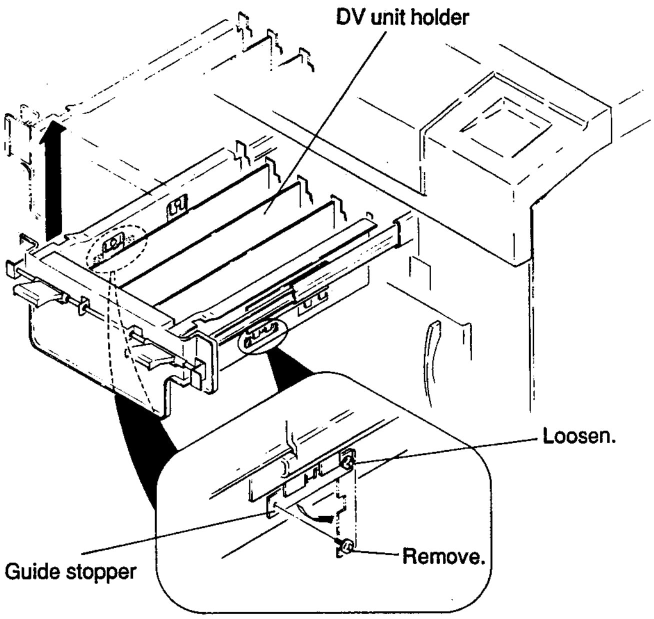
IV. Cleaning procedure

① Remove the PC belt (pre-transfer discharge lamp unit, discharge lamp unit, main corona unit, blank lamp/screen unit, TX belt, PC belt cleaner unit, TX belt cleaner unit, and gamma sensor.). (For details, refer to page 9-6.)

(Note) There is no need to remove the PC belt drive unit.

② Remove the developing unit and the developing unit holder.

(Note) Place the developing units on paper to protect the MG roller from the foreign material.



③ Clean the PC rollers and the pressure plates with cloth and alcohol.

## b. Drive roller cleaner replacement/cleaning

I. Necessary tools
  - Alcohol
  - Cloth
  - Plus screwdriver

II. Note
  - Do not scratch the rollers.
  - Use alcohol only. (Do not use other liquids.)

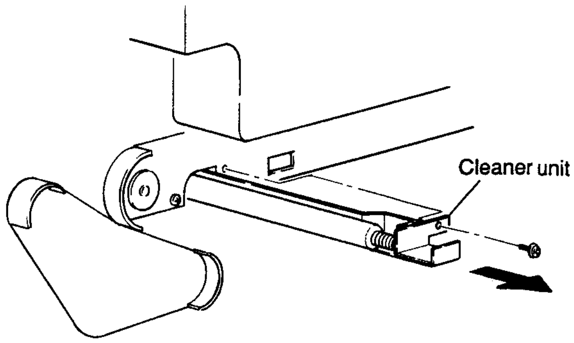
III. Problem caused by improper procedure
  - White spots or black spots on copy

IV. Replacement/cleaning procedure

Drive roller cleaner unit removal

① Remove the process unit bracket (door switch cover, waste toner collection bottle, and connectors). (See page 9-7)

② Remove the drive roller cleaner unit.



Cleaner roller disassembly

① Remove and replace the cleaner roller.

Cleaning procedure

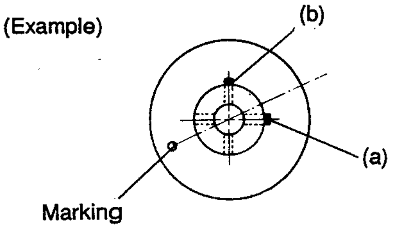
Clean the roller with cloth and alcohol.

### c. Installation of PC (and TX) drive roller gears (49T)

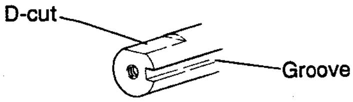
Unsmooth operation of the PC and the TX drive roller gears may cause trouble in registration. To prevent this, follow the procedures below for installation of the gears.

Installation of the 49T drive gear

1) Put a setscrew at the M4 tap which is the closest of the opposite position of (180 degree from) the marking. (a)
2) Put a setscrew at the M4 tap (b) which neighbors the above M4 tap in the counterclockwise direction.



3) Fix the gear to the drive roller shaft so that (a) is in the groove side and (b) is in the D-cut side in the sequence of (a) and then (b).



## (7) PC belt home position sensor replacement/cleaning

I. Necessary tools
- Cloth
- Plus screwdriver
- Vacuum cleaner

II. Problem caused by improper replacement/cleaning

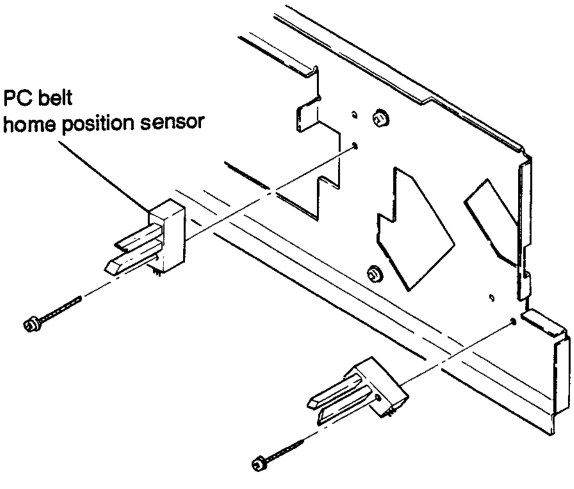
Home position sensor failure ↓ Copy image (color) shift / Self diagnosis L4 trouble

III. Replacement/cleaning procedure

PC belt home position sensor removal

① Remove the process unit bracket (door switch cover, waste toner collecting bottle, and connectors). (See page 9-7)

② Remove the PC belt home position sensor from the process unit bracket.



PC belt cleaning procedure

Clean the light emitting section and light receiving section with vacuum cleaner and a cloth dampened with water.

## (8) PC belt drive motor replacement

I. Necessary tools
- Cloth
- Plus screwdriver
- Vacuum cleaner

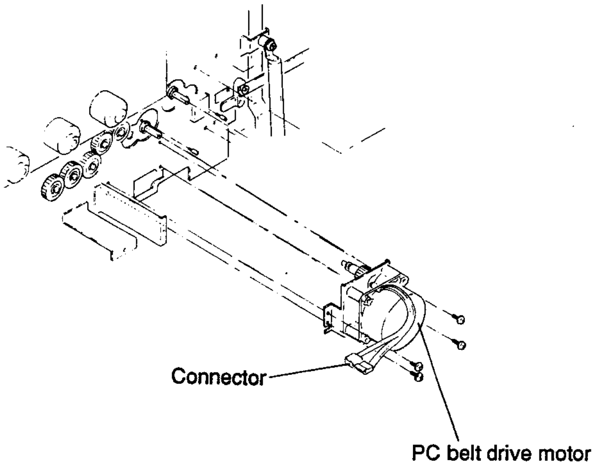
II. Problem caused by improper procedure
- Copy image (color) shift
- Self diagnosis L4 trouble.

III. Replacement procedure

PC belt drive motor removal

① Remove the rear exterior)

② Remove the motor as shown below:



(PC belt drive motor assembly)
Install the motor so that there is no backlash between the PC belt drive unit gear and the motor gear.

## (9) Waste toner full detection sensor cleaning

### I. Necessary tools

- Cloth

### II. Problems caused by improper procedure

Improper detection
↓
Toner clogging in the photoconductor belt cleaner unit
↓
Toner transport screw and drive gear lock-up → Gear damage
Toner scatter → Dirty copy

### III. Cleaning procedure

Clean the light emitting section and the light receiving section of the sensor with a water dampened cloth.

### (10) MHVG/DVBG replacement

#### I. Necessary tools

- Plus screwdriver
- Pliers

#### II. Note

- Do not adjust the VR's attached to MHVG/DVBG.

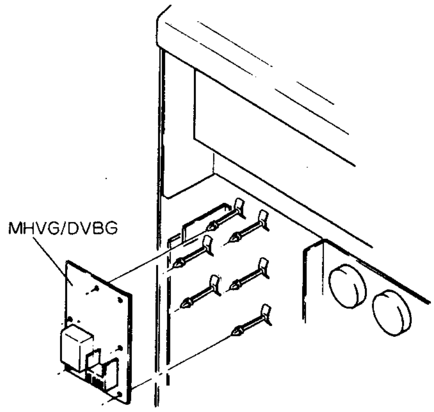
#### III. Replacement procedure

MHVG/DVBG disassembly

① Remove the rear upper exterior.

② Remove the PWB holder (with PWB).

③ Remove the MHVG/DVBG.



## 6. Adjustment

### A. List

| No. | Contents | Ref. page |
|---|---|---|
| (1) | Main corona grid voltage adjustment | 9-15 |
| (2) | Blank lamp position adjustment | 9-16 |
| (3) | PC cleaning blade cleaning pressure adjustment | 9-17 |
| (4) | Waste toner full detection level adjustment | 9-19 |
| (5) | PC belt tracking adjustment | 9-20 |

### B. Details of adjustment

### (1) Main corona grid voltage adjustment

#### I. General

- Use test commands 57, and 9. (Adjust with test command 57 and check with test command 9 mode 1.)
- The adjustment must be performed for the voltages in the following 4 modes.

| No. | Contents |
|---|---|
| ① | Full color & monochrome graphic mode main corona grid voltage |
| ② | Monochrome photo mode main corona grid voltage |
| ③ | Black-white graphic mode main corona grid voltage |
| ④ | Black-white photo mode main corona grid voltage |

#### II. Purpose

The purpose of the adjustment is to optimize the PC belt surface voltage to obtain copy of proper color balance.

#### III. The adjustment must be performed in the following cases:

- When the main PWB is replaced.
- When the main PWB RAM (IC144, 145) is replaced.
- When self diagnostic U2 trouble is eliminated.
- When the PC belt drive unit is removed or replaced.
- When MHVG/DVBG PWB unit is replaced.

#### IV. Necessary tools

- Plus screwdriver
- High voltage voltmeter (Max. measuring voltage DC1000V or more, input impedance 10MΩ or more)

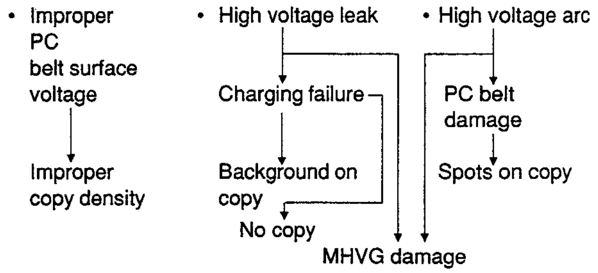
#### V. Note

- Before adjustment. the following items must be performed.

① Turn off the gamma correction. (Dip SW #4 set to on)

② Set the PC belt sensitivity No. to 2.

#### VI. Problems caused by improper procedure



#### VII. Adjustment procedure

① Remove the rear exterior.

② Turn off the gamma correction.
(Turn on the main PWB DIP switch No. 4 and turn the main power switch off then on.)

③ Set the PC belt sensitivity level to 2.
Execute test command 45. (C → 0 → 0 → C → 4 → 5 → COLOR PSW)

- The PC belt sensitivity set in the copy quantity indicator is displayed.)
(Push the numeric key 2.)
- "2" is displayed in the copy quantity indicator.
(Push the COLOR PSW.)
- The photoconductor belt sensitivity level is set to 2.
- Remove the PC belt. (Protect ozone damage durring adjustment)

④ Obtain the main corona grid voltage adjustment value from the main corona grid voltage set value noted on the memo sheet attached to the inside of the fron exterior.

| Mode | | Main corona grid voltage adjustment value |
|---|---|---|
| Full color & monochrom | Graphic | DC–335V – (Front cabinet memo No.38 recorded value –50) ±20V |
| Monochrome | Photo | DC–245V – (Front cabinet memo No.39 recorded value –50) ±20V |
| Black-white | Graphic | DC–485V – (Front cabinet memo No.49 recorded value –50) ±20V |
| | Photo | DC–295V – (Front cabinet memo No.50 recorded value –50) ±20V |

⑤ Execute test command 9. (C → 0 → 0 → C → 9 → COLOR PSW)

⑥ Select the output mode referring to the table below:
(Displays of each section and grid voltage output mode)

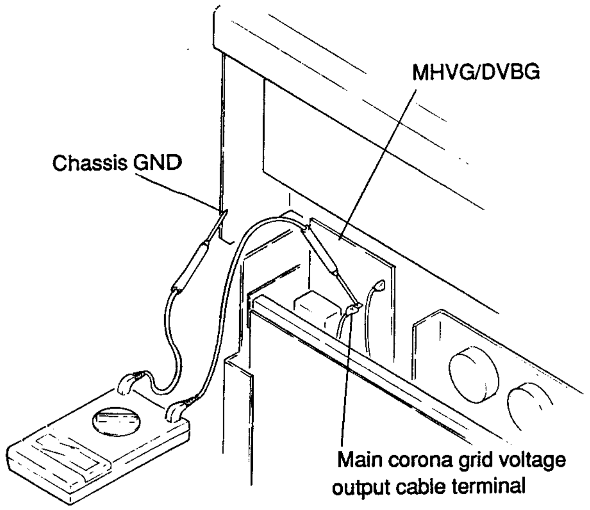
| Monochrome lamp | Developer lamp | Photo lamp | Grid voltage | output mode |
|---|---|---|---|---|
| Regardless of ON/OFF | Either of Y, M, C is ON. | OFF | Full color | Graphic |
| ON | | ON | Monochrome | Graphic photo |
| OFF | BK is ON. | OFF | Black-white | Graphic |
| | | ON | | Photo |

(Select the photo mode or the graphic mode.)
(Use the paper size select key to select the full color mode, monochrome mode, or black-and-white mode.)

- The developer lamp allows monitoring.

(Note) The contrast level and the copy density level must be at the center.

⑦ Slide the main corona voltage output cable terminal protection tube off of the terminal.



⑧ Set the voltmeter between the main corona voltage output cable terminal and the chassis (GND).

⑨ Push the COLOR PSW.

- The main corona grid voltage in the mode selected in procedure ⑥ is supplied for 30 sec.
  During test command operation, the ready lamp is off.

⑩ Check that the main corona grid voltage is within the specified range of the adjustment value obtained in step ④.

| Mode | | Main corona grid voltage adjustment value |
|---|---|---|
| Full color & monochrome | Graphic | DC–335V – (Front cabinet memo No.38 recorded value –50) ±20V |
| Monochrome | Photo | DC–245V – (Front cabinet memo No.39 recorded value –50) ±20V |
| Black-white | Graphic | DC–485V – (Front cabinet memo No.49 recorded value –50) ±20V |
| | Photo | DC–295V – (Front cabinet memo No.50 recorded value –50) ±20V |

Note: In the full color photo mode, the main corona grid voltage outputs in the high density (HD) area and the low density (LD) area are calculated based on the monochrome color photo mode grid voltage. (HD: DC–225V, LD: DC–175V) Therefore there is no need for the grid voltage adjustment in the HD and LD areas. (If full color photo mode HD/LD grid voltage is erroneously adjusted, the monochrome color photo mode grid voltage is also changed. Therefore, do not adjust.)

If the main corona grid voltage is outside the specified range of the adjustemt value obtained in step ④, repeat procedures ⑪ through ⑮ until it is within the specified range.

⑪ Execute test command 57. (C → 0 → 0 → C → 5 → 7 → COLOR PSW)

- The main corona grid voltage set value is displayed in the copy quantity indicator.

⑫ Select the adjustment mode referring to the table below:
For displays of each section and grid voltage adjustment mode, refer to the table in ⑥.

Select the photo mode or the graphic copy mode.
Use the paper size select key to select the full color mode, monochrome mode, or black-and-white copy mode.

- the developer lamp allows monitoring.

⑬ Input the set value with the numeric keys.

- The inputted value is displayed in the copy quantity indicator.

When the set value is changed by 1, the main corona grid voltage is changed by 1V.
The greater the set value, the greater the main corona grid voltage.
The smaller the set value, the smaller the main corona grid voltage.

⑭ Push the COLOR PSW.
The set value in procedure ⑬ is displayed.

⑮ Perform procedures ⑤ through ⑩.

⑯ Set the PC belt sensitivity to match the PC belt number using test command.

⑰ Turn on gamma correction Main PWB dip SW 4.

⑱ Perform gamma correction.
C→0→0→C→6→1→PSW

## (2) Blank lamp position adjustment

### I. General

This adjustment aligns the center of the copy image on the PC belt with the center of the blank lamp by changing the position of the blank lamp.

### II. Purpose

The purpose of this adjustment is to properly discharge the area outside the copy image.

### III. This adjustment should be made in the following cases:

- When the image center position is adjusted.
- When the blank lamp is disassembled or replaced.

### IV. Tools required for adjustment

- A3 or 11" x 17" copy paper
- Plus (+) screwdriver

### V. Note

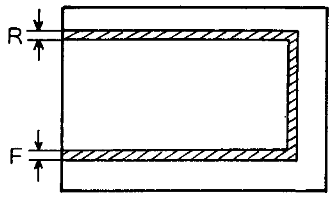
- Before this adjustment, the copy image center position adjustment should be completed. (See page 8-25)

### VI. Adjustment procedure

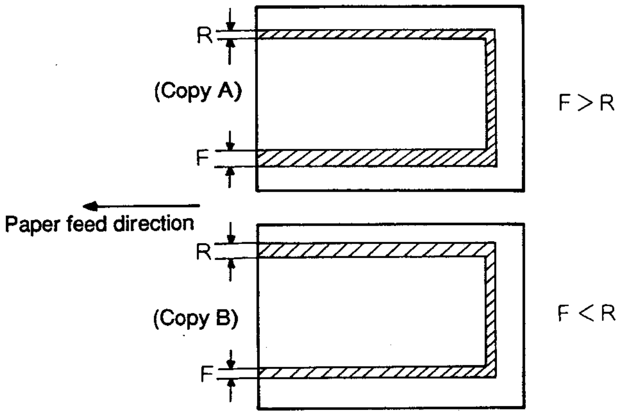
① Set A3 or 11" x 17" copy paper on the original table. Make a black-and-white reduction (64%) copy with A3 or 11" x 17" copy paper with the original cover open.

② Check the shift between the copy image and the blank lamp.

- Check the difference between the width of black copied section in the front side (F) and that in the rear side (R).



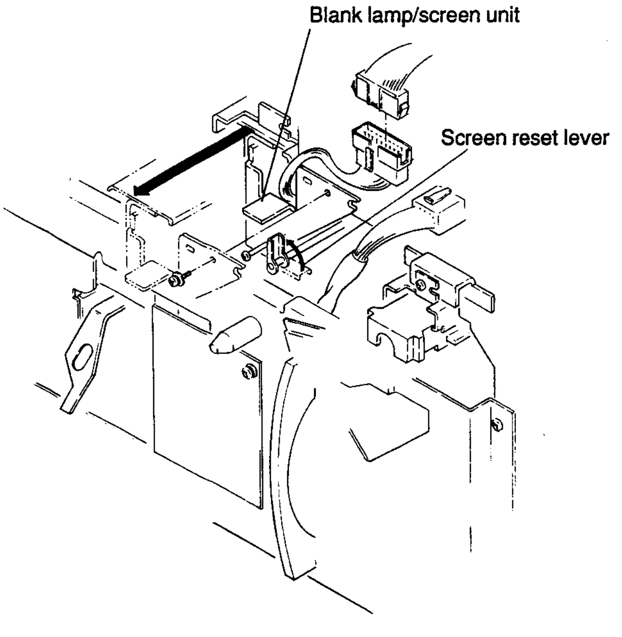
If the difference between F and R is 1.0mm or more, perform procedures ③ through ⑧ until the difference is within 1.0mm. If the difference is within 1.0mm, the adjustment is complete.


R
(Copy A)
F
F > R
Paper feed direction
R
(Copy B)
F
F < R

③ Reset the screen

(Note) When installing or removing the blank lamp/screen unit, the screen should be reset to the (GR) position.

④ Remove the blank lamp/screen connector and pull out the blank lamp unit.

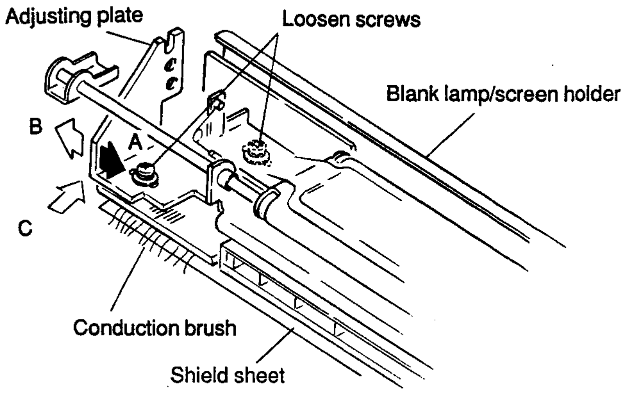

Blank lamp/screen unit
Screen reset lever

(Note) Be careful not to deform the conduction brush and the shield sheet.

⑤ Loosen the adjusting plate fixing screw.

⑥ Move the adjusting plate in the direction of arrow.

- For copy A, move the adjusting plate in the direction of arrow A.
- For copy B, move the adjusting plate in the direction of arrow B.


Adjusting plate
Loosen screws
Blank lamp/screen holder
B
A
C
Conduction brush
Shield sheet

⑦ Fix the adjusting plate.

- Before tightening the screws press the adjusting plate in direction C then tighten screws.

⑧ Install the blank lamp unit to the body.

⑨ Perform procedure ②.

## (3) The PC cleaning blade cleaning pressure adjustment

### I. General

This adjustment must be performed for the main blade and the sub blade.

The cleaning blade is in contact with the PC belt at proper pressure by adjusting the position of the cleaning blade mounting plate and the stroke of the cleaning solenoid.

### II. Purpose

The purpose of the adjustment is to assure proper cleaning.

### III. The adjustment must be performed in the following cases:

- When the PC belt cleaner unit is disassembled.
- When the cleaner blade mounting plate is replaced.
- When the cleaner solenoid is replaced.

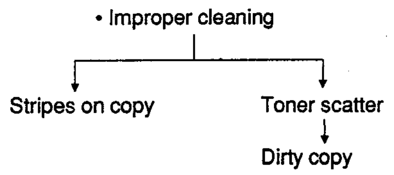
### IV. Necessary tools

- Plus screwdriver
- Slide calipers or ruler

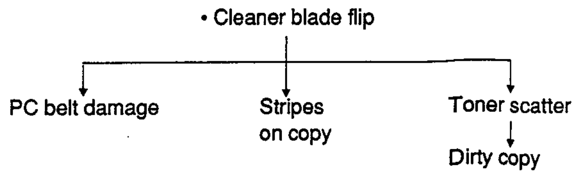
### V. Problems caused by improper adjustment

a. Main blade

[When the cleaning pressure is too low]


• Improper cleaning
Stripes on copy
Toner scatter
Dirty copy

[When the cleaning pressure is too high]


• Cleaner blade flip
PC belt damage
Stripes on copy
Toner scatter
Dirty copy

b. Sub blade

[When the cleaning pressure is too low]

- Improper cleaning

↓ Stripes on copy

↓ Toner scatter → Dirty copy

[When the cleaning pressure is too high]

- Cleaner blade flip

↓ PC belt damage

↓ Stripes on copy

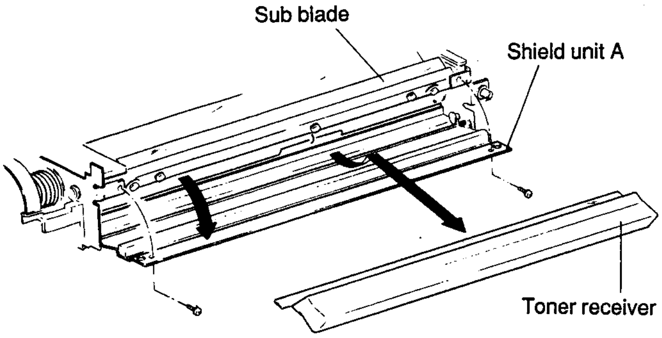
↓ Toner scatter → Dirty copy

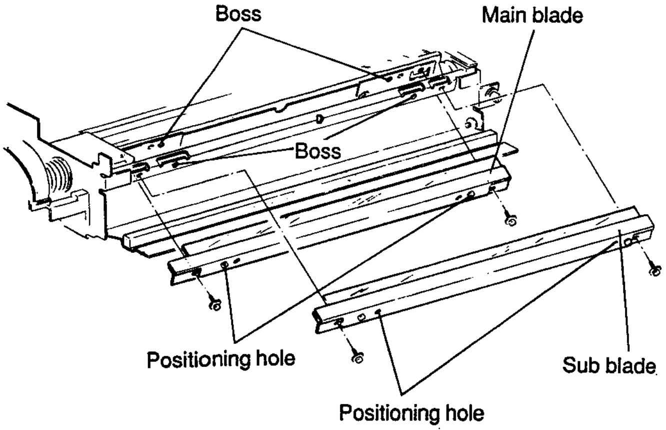
## VI. Adjustment procedure

a. Main cleaning blade position adjustment

① Remove the PC belt cleaner unit from the copier body.

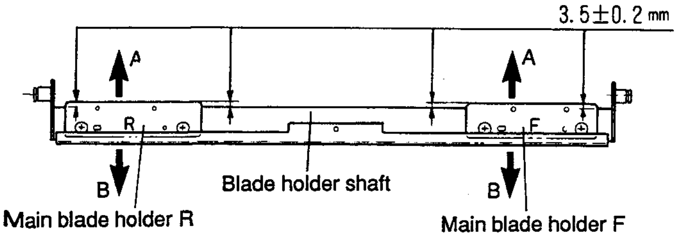
② Remove the sub and main cleaner blades


Sub blade
Shield unit A
Toner receiver


Boss
Main blade
Boss
Positioning hole
Sub blade
Positioning hole

③ Loosen the main blade holder fixing screw (red screw).

④ Slide the main blade holders F and R in the arrow direction and adjust so that the main blade holders F and R and the main blade holder shaft are as shown below. Then secure the screws.


3.5±0.2 mm
A
A
R
F
B
B
Blade holder shaft
Main blade holder R
Main blade holder F

(The more the blade holder is moved in the direction of arrow A, the greater the cleaning pressure is.)
(The more the blade holder is moved in the direction of arrow B, the smaller the blade cleaning pressure is.)

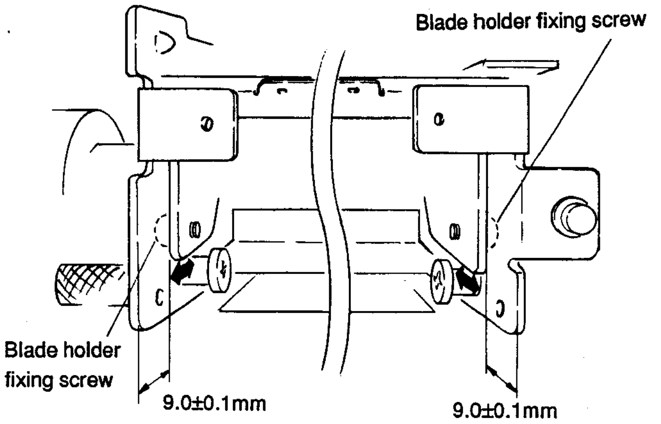
b. Sub cleaner blade position adjustment

① Remove the PC belt cleaner unit from the copier body.

② Remove the sub cleaning blade.

③ Loosen the blade holder fixing screws (2 pcs.) in the front and rear frame sides.

④ Slide the sub blade holders F and R in the arrow direction, and adjust so that the sub blade holders F and R and the cleaner unit are as shown below. Then secure the screws.


Blade holder fixing screw
Blade holder fixing screw
9.0±0.1mm
9.0±0.1mm

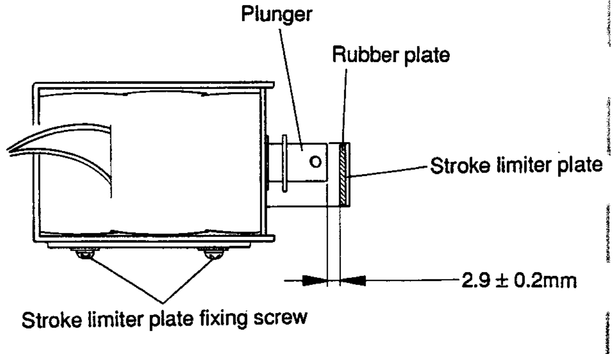
(The more the blade holder is moved in the direction of arrow A, the greater the cleaning pressure is.)
(The more the blade holder is moved in the direction of arrow B, the smaller the blade cleaning pressure is.)

(Note) Perform the procedure with the sub blade holder projection fit in the cleaner unit frame hole.

c. PC cleaning solenoid stroke adjustment

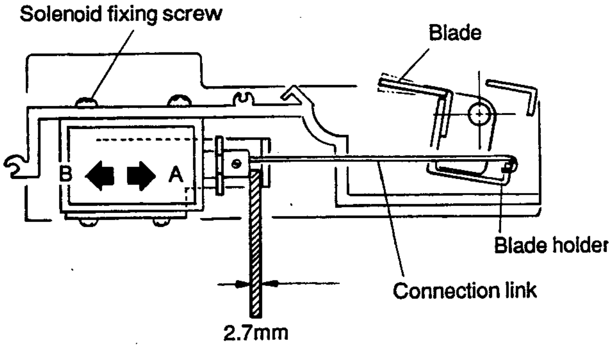
① Remove the cleaning solenoid.

② Loosen the plunger stroke limiter plate fixing screws (2 pcs).


Plunger
Rubber plate
Stroke limiter plate
2.9 ± 0.2mm
Stroke limiter plate fixing screw

③ Push the plunger fully in the arrow direction A, and slide and adjust the solenoid stroke limiter plate in the arrow direction so that the distance between the solenoid stroke limiter plate and the plunger head is 2.9 ±0.2mm. Tighten screws.
(The greater the distance between the plunger stroke limiter plate and the plunger head is, the longer the plunger stroke is and the greater the cleaning pressure is.)
(The smaller the distance between the plunger stroke limiter plate and the plunger head is, the shorter the plunger stroke is and the smaller the cleaning pressure is. When cleaning is not performed, the distance between the PC belt and shield unit A and blade becomes smaller. In some cases, it may be always kept in contact with the PC belt and partially thin copy may be made.)

④ Loosen the solenoid fixing screw.



⑤ Temporarily fix the cleaning solenoid to the cleaner unit. (Allow clearance for the cleaner solenoid to move.)

⑥ Hang the plunger connecting link on the blade holder.

⑦ Insert 2.7mm thickness gauge between the solenoid stroke limiter plate and the plunger head. Under that state, slide the cleaning solenoid in arrow direction A as far as possible.
(When the mounting position of the cleaning solenoid is moved in the direction of arrow A, the cleaning pressure becomes greater. When cleaning is not performed, distance between the PC belt and shield unit A and the blade becomes smaller. In some cases, it may be kept always in contact with the PC belt, producing partially thin copy.)
(When the mounting position of the blade holder is moved in the direction of arrow B, the cleaning pressure becomes smaller.)

⑧ Slowly slide the cleaner solenoid in direction B. Tighten the solenoid fixing screws at the point just before the blade starts to move.

## (4) Waste toner full detection level adjustment

### I. General

The full level of the waste toner collection bottle is changed by varying the spring tension.
The detection level is about 300g.

### II. Purpose

The purpose is to warn the operator that the waste toner bottle is full. Copying is impossible in this condition.

### III. The adjustment must be performed in the following cases:

- When any parts associated with the waste toner bottle are disassembled or replaced.
- When the waste toner collection bottle receiver tension spring is replaced.

### IV. Necessary tools

- Plus screwdriver
- Water
- Scale
- An empty waste toner collection bottle

### V. Problems caused by improper adjustment

- Detection failure

↓

Toner clogging in
the photoconductor
belt cleaner unit

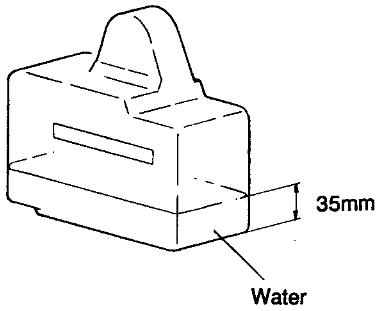
↓ Toner transport screw and drive gear lock-up → ↓ Gear damage

↓ Toner scatter → ↓ Dirty copy

### VI. Adjustment procedure

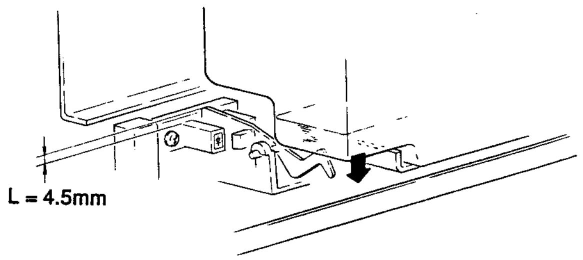
① Place an empty waste toner collection bottle on a flat table.

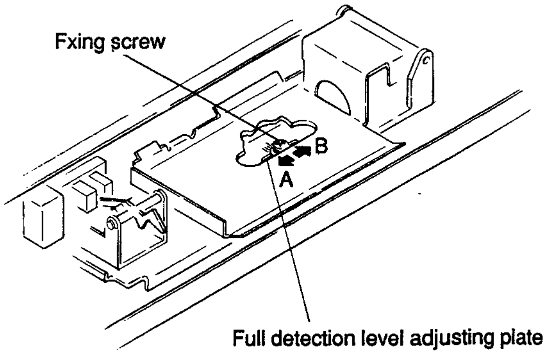
② Put water in the empty waste toner collection bottle up to the height of 35mm from the flat table as shown in the figure below: (approx. 300cc)



③ Loosen the fixing screw

④ Place the waste toner collection bottle on the waste toner collection bottle receiver. Slide and adjust the full detection level adjusting plate in the arrow direction so that the waste toner full detection sensor (TFD1) actuator is as shown in the figure below:





When the full detection level adjusting plate is moved in direction A, L becomes smaller and the detection level becomes greater.
When the full detection level adjusting plate is moved in direction B, L becomes greater and the detection level becomes smaller.

### (5) PC belt tracking adjustment

#### I. General

The PC belt tracking level is adjusted by changing tension of the tension spring in the front and rear frame sides of the PC belt.

#### II. Purpose

By adjusting the PC belt front and rear frame side tracking to the normal level, L4-7 or other troubles caused by improper tracking are prevented.

#### III. This adjustment is required in the following case:

- When the PC drive roller or tension roller is replaced.

#### IV. Adjustment procedure

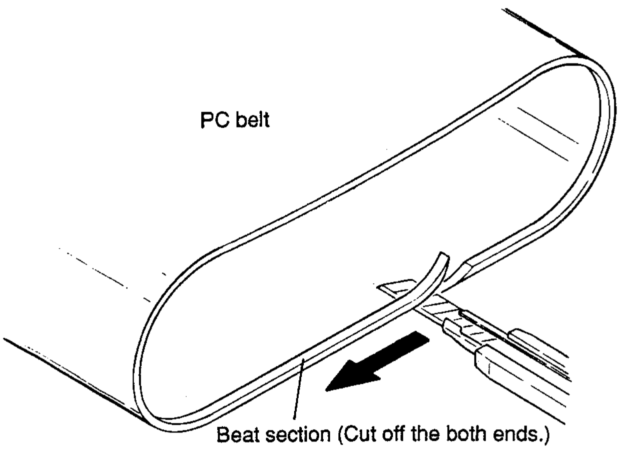
① Remove the process angle. (Refer to 9-7.)

② Release the PC belt tension and remove the PC belt and the transfer belt. (Refer to 9-8.)

③ Remove the right side cabinet.

④ After cutting off the beat sections of the PC belt, attach the PC belt and the transfer belt to the copier body. In this case, it is advisable to replace the transfer belt with a new one.

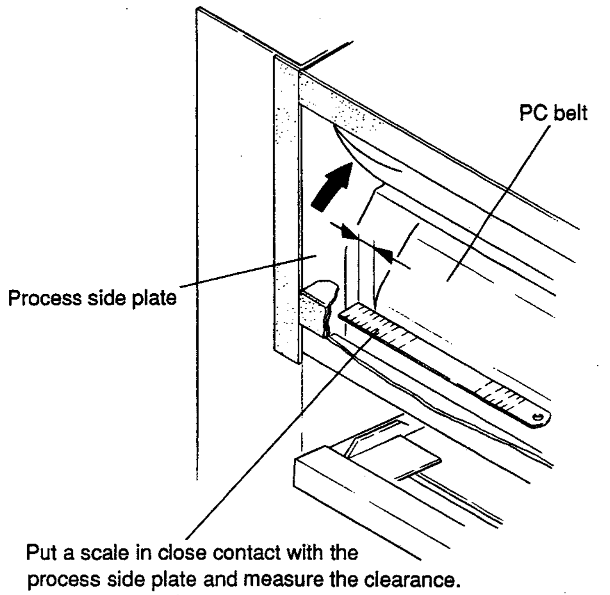
Note: For a PC belt without beat section, cut off the beat section of an old belt and keep it for the use as a jig.



⑤ Align the PC belt surface and the drive roller surface and apply a pressure with the pressure release lever.

⑥ Apply a pressure to the transfer belt similarly, and attach the process plate F.

⑦ Measure the dimension from the process angle to the PC belt edge as shown below, and memorize it.

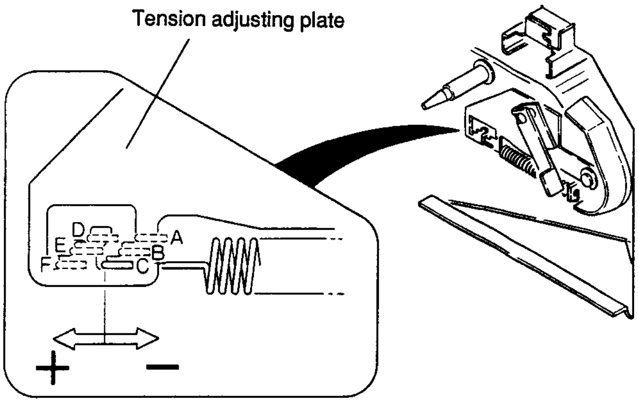

PC belt
Process side plate
Put a scale in close contact with the process side plate and measure the clearance.

⑧ Execute test command 23 and race the PC belt for 1 minute. Then measure the clearance between the process angle and the PC belt edge in the same manner as ⑦.

⑨ Compare the measured values in ⑦ and ⑧ and obtain the belt shift direction (tracking direction) and shift quantity (tracking quantity).

⑩ Adjust the tension plate tension to intensify the tension in the tracking direction.

- When tracking in the front frame side (value in ⑦ is greater than value in ⑧), intensify the tension in the front frame side.
- When tracking in the rear frame side (value in ⑦ is smaller than value in ⑧), intensify the tension in the rear frame side.
- Adjust tension of 1 kg for 1mm shift.
  (When adjusting the front frame side)
- When the difference between the measurement values in ⑦ and ⑧ is within ±0.15mm, no need to measure.



Refer to the following table an change the spring position in (+) direction by the tracking dimension.

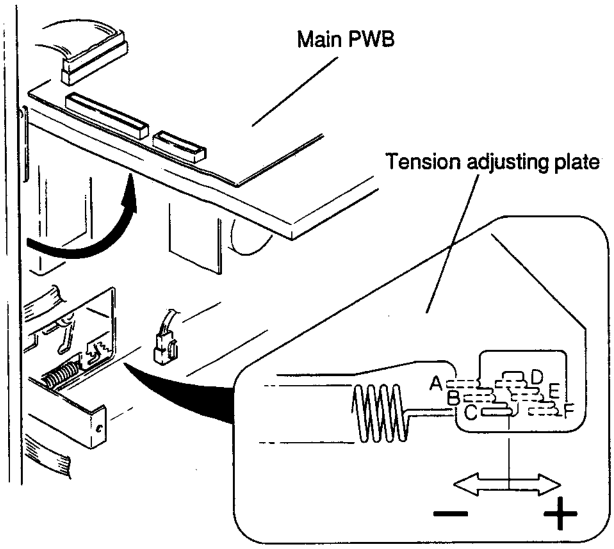
When the spring is hooked fully to ⊕ side (E or F) and cannot be stretched further, loosen the oppsite side (the rear frame side) in ⊖ direction and stretch the spring.

| Position / Spring kind | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Thin | 3.0kg | 3.5kg | 4.0kg | 4.5kg | 5.0kg | 5.5kg |
| Thick (Red) | 4.2kg | 5.3kg | 6.3kg | 7.4kg | 8.4kg | 9.5kg |

Two kinds of springs are used according to the machine. The thin spring and the thick spring can be identified with their colors.

(When adjusting the rear frame side)

Remove the rear cabinet and the main PWB mounting plate and adjust.

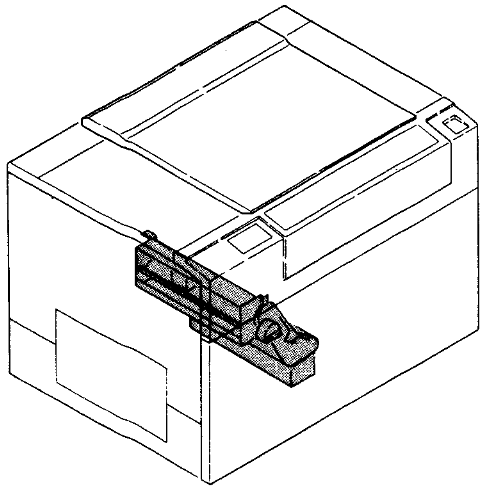


Refer to the table above and change the spring position in (+) direction by the tracking dimension.

When the spring is hooked fully to ⊕ side (E or F) and cannot be stretched further, loosen the opposite side (the front frame side) in (−) direction and stretch the spring.

⑪ Check that the tracking is within ±0.5mm with procedures ⑧ and ⑨.

# [10] TRANSFER BLOCK



## 1. General

The transfer block is composed of the TX belt, TX belt drive unit, primary transfer roller, secondary transfer roller unit, gamma sensor, TX belt cleaner, and pre-transfer discharge lamp unit.

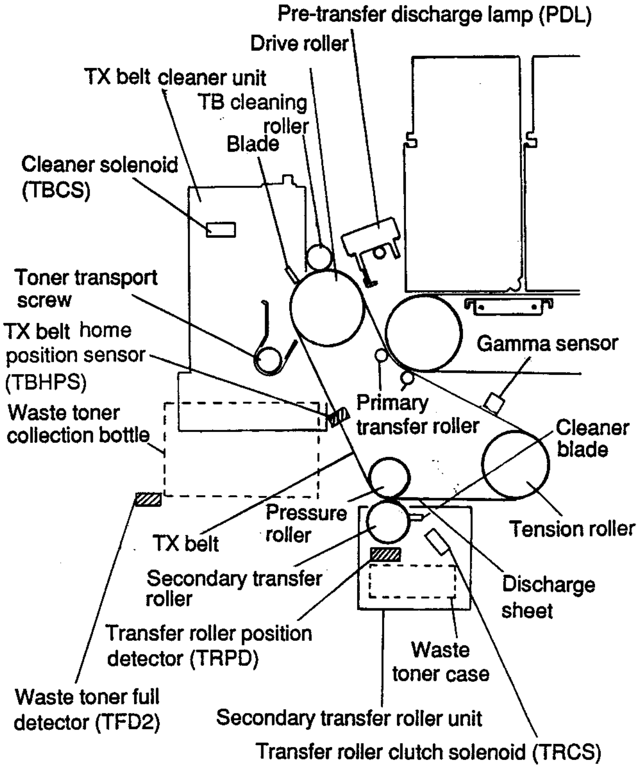
In this section, the developed toner image on the photoconductor belt is transferred to the TX belt by the primary transfer rollers. The toner image on the TX belt is then transferred to the paper by the secondary transfer roller.

To maintain constant copy quality, the density of the yellow, magenta and cyan toners are checked by the gamma correction sensor and main PWB at power on. The main PWB then varies the grid voltage drive signal to the MHVG PWB to raise or lower the grid voltage to obtain the correct image density.

## 2. Specifications

- Transfer medium: TX belt
- Transfer system: Roller system
- Separation system: Natural separation system
- Transfer speed: 3 speeds (184mm/sec, 115mm/sec, 60mm/sec)

## 3. Construction (Identification)

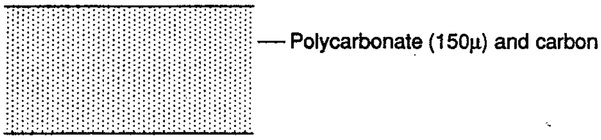

Pre-transfer discharge lamp (PDL)
Drive roller
TX belt cleaner unit
TB cleaning roller
Blade
Cleaner solenoid (TBCS)
Toner transport screw
TX belt home position sensor (TBHPS)
Waste toner collection bottle
Gamma sensor
Primary transfer roller
Cleaner blade
Pressure roller
TX belt
Tension roller
Secondary transfer roller
Discharge sheet
Transfer roller position detector (TRPD)
Waste toner case
Waste toner full detector (TFD2)
Secondary transfer roller unit
Transfer roller clutch solenoid (TRCS)

## 4. Major parts and functions

### (1) TX belt

This is a seamless belt composed of carbon and polycarbonate.

(Construction of the transfer medium)


Polycarbonate (150μ) and carbon

### (2) Primary transfer roller

The FRHVG applies a negative voltage to the two primary transfer rollers. This transfers the developed toner image from the PC belt to the TX belt.

The voltage applied to the rollers varies according to the transfer mode.

**The voltage is supplied by FRHVG.**

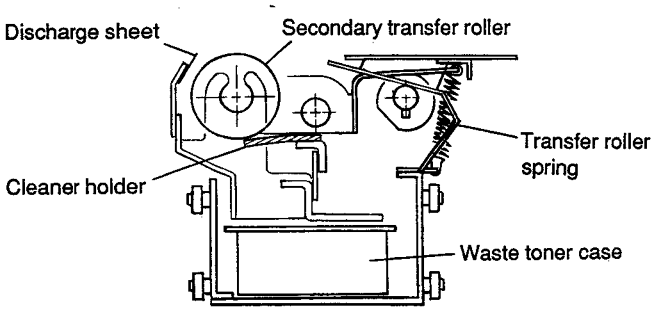
| Copy mode / Operation mode | Full color | | Monochrome | | | | Black/White | |
|---|---|---|---|---|---|---|---|---|
| | | | Y, M, C | | R, G, B | | | |
| | GR | PH | GR | PH | GR | PH | GR | PH |
| First layer transfer | DC–500V | DC–500V | DC–500V | | DC–500V | | DC–900V | |
| Second layer transfer | DC–500V | DC–500V | — | | DC–500V | | — | |
| Third layer transfer | DC–900V | DC–600V | — | | — | | — | |
| Fourth layer transfer | — | DC–600V | — | | — | | — | |
| Fifth layer transfer | — | DC–700V | — | | — | | — | |
| Sixth layer transfer | — | DC–900V | — | | — | | — | |
| No transfer/racing (with toner retained) | DC–600V | * | DC–600V | | DC–600V | | DC–600V | |

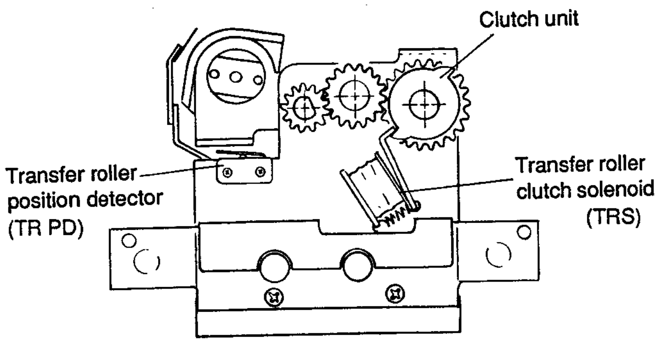
* In the full color photo mode, when no transfer/racing of the first to the fifth layer: DC–500V.
When no transfer/racing of the sixth layer: DC–600V.

Output voltage allowable range
First ~ sixth layers: ±15V
No transfer/racing: ±10V

### (3) Secondary transfer roller unit

Composed of the transfer roller, transfer roller clutch, transfer roller position detector, and discharge sheet.


Discharge sheet
Secondary transfer roller
Transfer roller spring
Cleaner holder
Waste toner case


Clutch unit
Transfer roller position detector (TR PD)
Transfer roller clutch solenoid (TRS)

#### a. Transfer roller

The SRHVG unit applies a negative voltage to the secondary transfer roller. This transfers the developed toner image from the TX belt to the copy paper.

#### Transfer mode and SRHVG.

| Transfer speed | Toner used | Transfer paper kind | Secondary transfer roller voltage |
|---|---|---|---|
| 184mm/sec | 2 or more colors | Plain paper (Length in transport direction 216mm or less) | DC –1.6±0.05KV |
| 184mm/sec | 1 color | Plain paper | DC –1.4 ±0.05KV |
| 115mm/sec | 2 or more colors | Plain paper (Length in transport direction 216mm or more) | |
| 60mm/sec | No relationship | OHP film | DC –2.0± 0.05KV |

#### b. Transfer roller clutch

A solenoid and wrap-spring clutch is used to drive the secondary transfer roller against the TX belt for image transfer to the copy paper. The solenoid drive signal is controlled by the main PWB.

| Copy mode | Paper kind | Fusing speed | Paper transfer speed |
|---|---|---|---|
| Full color | Plain paper (*1) | 115mm/Sec | 184mm/Sec |
| | Plain paper (2) | 115mm/Sec | 115mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Monochrome (R. G. B.) | Plain paper (*1) | 115mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 115mm/Sec | 115mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Monochrome (Y. M. C.) | Plain paper (*1) | 184mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 184mm/Sec | 184mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |
| Black-and-white | Plain paper (*1) | 184mm/Sec | 184mm/Sec |
| | Plain paper (*2) | 184mm/Sec | 184mm/Sec |
| | OHP film | 60mm/Sec | 60mm/Sec |

*1: The length in transport direction is 216mm or less.

*2: The length in transport direction is 216mm or above.

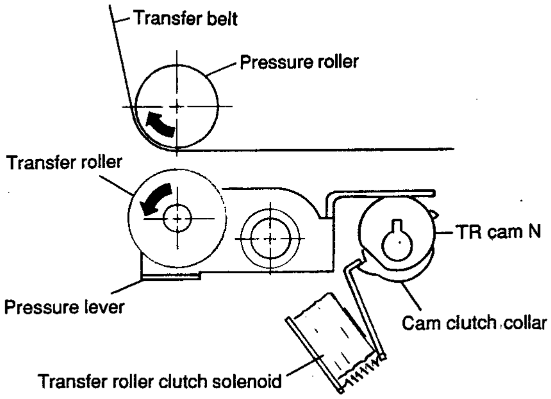
#### c. Transfer roller position detector

A microswitch is used to detect whether the secondary transfer roller is in contact with the copy paper and the TX belt.
The detector turns on when the roller is in contact with the paper and the signal is sent to the main PWB.

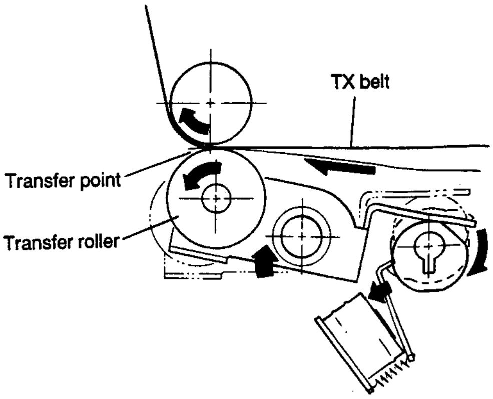
#### d. Discharge sheet

Used to discharge the paper which has been charged during transfer operation.
(Secondary transfer roller operation)
Refer to the timing table on the next page.

① The figure below shows positions of the transfer roller, transfer roller cam, cam clutch collar, and transfer solenoid when the roller is not in contact with the TX belt.


Transfer belt
Pressure roller
Transfer roller
TR cam N
Pressure lever
Cam clutch collar
Transfer roller clutch solenoid

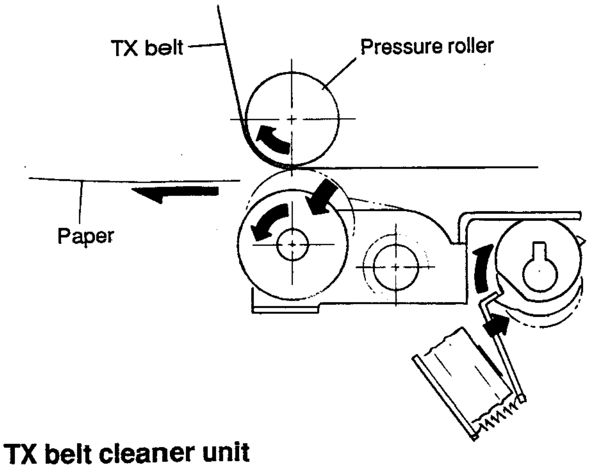
② The transfer roller solenoid is kept ON for T1 time, the transfer roller solenoid latch is disengaged from the cam clutch collar, and the transfer roller cam rotates 180 degrees. Therefore, the transfer roller is pressed against the TX belt and pressure roller by the pressure spring. After T2 sec, a transfer voltage is applied to the transfer roller and paper is inserted between the transfer roller and the TX belt to perform transfer.


TX belt
Transfer point
Transfer roller

| Transfer mode | | Operation time | | |
|---|---|---|---|---|
| Paper kind | Copy mode | T1 (m sec) | T2 (m sec) | T3 (m sec) |
| Plain paper (*1) | Monochrome (Y,M,C) | 100 | 54 | 100 |
| Plain paper (*2) | Monochrome (Y,M,C) | 100 | 54 | 100 |
| Plain paper (*1) | Monochrome (R,G,B) or full color | 100 | 54 | 100 |
| Plain paper (*2) | Monochrome (R,G,B) or full color | 160 | 87 | 160 |
| OHP film | | 310 | 200 | 310 |

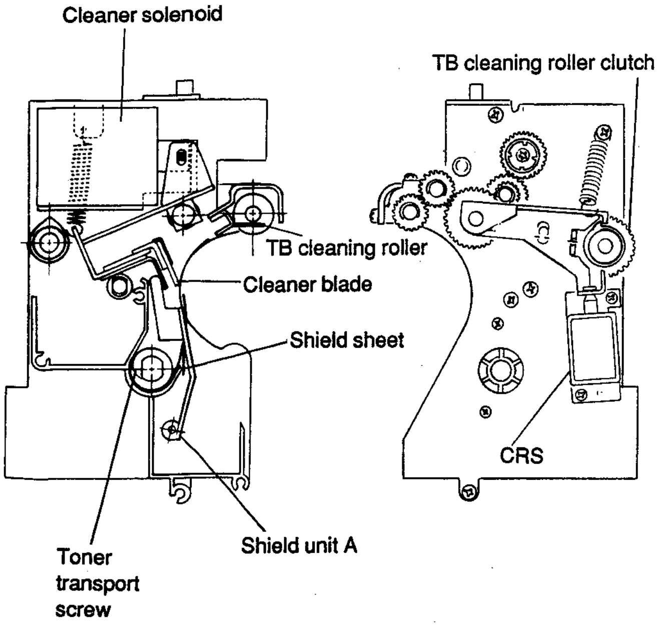
*1: Length in transport direction 216mm or less.
*1: Length in transport direction 216mm or more.

③ After transfer, when the paper rear edge is 10mm away from the transfer roller, application of the voltage is terminated. After 100msec, the transfer roller solenoid is kept ON for T3 sec to disengage the transfer roller solenoid latch from the cam clutch collar, rotating the transfer roller cam 180 degrees. At that time, the pressure lever is rotated counterclockwise by the transfer roller cam, separating the transfer roller from the TX belt.



## (4) TX belt cleaner unit

Used to remove residual toner on the TX belt after completion of transfer.
Composed of the blade, cleaner solenoid, toner seal, toner transport screw, TB cleaning roller, clutch and solenoid.
This unit cleans the TX belt before transfer of toner image from the PC belt to the TX belt and after transfer of toner image from the TX belt to the paper.



### a. Blade

The blade is separated from or brought into contact with the TX belt by ON-OFF operation of the cleaner solenoid.
It is in contact with the TX belt before image formation on the TX belt and after transfer of image onto paper to perform cleaning. In color copy mode when 3-color image is being formed on the TX belt, the blade is separated from the belt.

The toner removed by the blade is passed to the waste toner collection bottle by the transport screw.

### b. Shield unit

The three shield units are provided to prevent toner from splashing from the cleaner unit.

- Shield unit F

Shield unit F prevents toner from splashing the cleaner unit front frame side. A sheet and felt are attached to the shield unit plate.

- Shield unit R

Shield unit R prevents toner from splashing from the cleaner unit rear frame side. A sheet and felt are attached to the shield unit plate.

- Shield unit A

Shield unit A prevents toner from splashing from the cleaner unit right side when cleaning.
It is separated from or brought into contact with the TX belt by on-off operation of the cleaner solenoid.
A sheet is attached to the shield unit plate.

### c. Shield sheet

The shield sheet is pasted on the cleaner frame. It eliminates clearance between the toner transport section and shield unit A when shield unit A is separated from or brought into contact with the TX belt, preventing toner leakage outside the transport section.

### d. Cleaner solenoid

The cleaner solenoid drives the cleaner blade. It is driven by the main PWB.

### e. Toner transport screw

Used to transport toner in the cleaner unit to the waste toner collection bottle.

### f. TB cleaning roller

Used to remove toner adheared to the TX belt. Brought into close contact with or separated from the TX belt when a certain number of copy quantity is reached.
Driven by the DV motor.

### g. TB cleaning roller clutch

The TB cleaning roller clutch is a spring clutch which drives the grinder when in close contact with the TX belt.
It is driven by the solenoid.

## (5) TX belt drive unit

The TX belt drive unit is composed of the drive roller, tension roller, transfer motor, and transfer motor control PWB.

### a. Drive roller

Used to rotate the TX belt.
The surface is coated with urethane rubber.

### b. Tension roller

Used to apply uniform tension to the TX belt.
With the lever, tension is applied or released.

### c. Transfer motor

This is a DC brushless servo motor used to rotate the TX belt.
The rpm varies according to the operation mode.
It is driven by the transfer motor control PWB.

### d. Brake

Installed in the TX belt drive shaft and used to reduce backlash of the gear, reducing color shift.

### (6) TX belt home position sensor

This is a photo transmission sensor used to sense the TX belt home position. The sensor output is passed to the main PWB.
Position adjustment of the PC belt and the TX belt and positioning of copy image are based on the sensor signal.

### (7) Pre-transfer discharge lamp unit

Used to project light to the PC belt before transfer of toner image from the PC belt to the TX belt, reducing the PC belt surface voltage, weakening the adherence between toner and the PC belt, and improving the transfer efficiency.
Driven by the main PWB.

### (8) Gamma sensor

Used to sense the density of the toner image on the TX belt for the main corona grid voltage (PC belt surface voltage) when gamma reference level is set or when gamma correction is performed.
A reflection type photo sensor is used.
The sensor output is passed to the main PWB.

### (9) Waste toner full detector

Used to detect toner full (about 300g) state in the waste toner collection bottle.
A photo transmission sensor is used. When toner full is detected, it is at LOW level.
The detector output is passed to the main PWB.

### (10) Waste toner collection bottle

Used to receive waste toner transported from the TX belt cleaner unit.

## 5. Major parts disassembly, assembly, replacement, and cleaning

### A. List

| Item No. | | Part name | When replacement is required | When cleaning is required | Ref. page |
|---|---|---|---|---|---|
| (1) | | TX belt | At maintenance (every 20K scan) | At every maintenance | 10-4 |
| (2) | | Primary transfer roller | | At every maintenance | 10-7 |
| (3) | | Secondary transfer roller unit | | At every maintenance | 10-7 |
| | a | Secondary transfer roller | | At every maintenance | 10-7 |
| | b | Cleaner blade | At maintenance (every 10K copy) | At every maintenance | 10-8 |
| | c | Shield unit F | At maintenance (every 120K copy) | At every maintenance | 10-8 |
| | | Shield unit R | At maintenance (every 120K copy) | At every maintenance | |
| | d | Discharge unit | | At every maintenance | 10-8 |
| | e | Waste toner case | | At every maintenance | 10-9 |
| (4) | | TX belt cleaner unit | | | 10-9 |
| | a | Cleaner blade | At maintenance (every 20K scan) | At every maintenance | 10-9 |
| | b | Shield unit F | | | 10-10 |
| | | Shield unit R | At maintenance (every 120K scan) | At every maintenance | |
| | c | Shield unit A | At maintenance (every 120K scan) | At every maintenance | 10-10 |
| | d | Shield sheet | At maintenance (every 120K scan) | At every maintenance | 10-10 |
| | e | Toner transport screw | | | 10-10 |
| | f | TB cleaning roller | | At every maintenance | 10-11 |
| (5) | | TX belt drive unit | | | 10-11 |
| | a | Drive roller | | At every maintenance | 10-11 |
| | | Tension roller | | At every maintenance | |
| | | Pressure roller | | At every maintenance | |
| | b | Drive motor | | | 10-11 |
| (6) | | TX belt home position sensor | | At maintenance (every 20K scan) | 10-12 |
| (7) | | Pre-transfer discharge lamp unit | | At every maintenance | 10-12 |
| (8) | | Gamma sensor | | At every maintenance | 10-12 |
| (9) | | SRHVG | | | 10-13 |
| (10) | | Waste toner full sensor | | At every maintenance | ★9-14 |

### B. Procedure

### (1) TX Belt replacement

1. Necessary tools
   - Plus screwdriver
   - TX belt protection material (Required when a used TX belt is reused.)

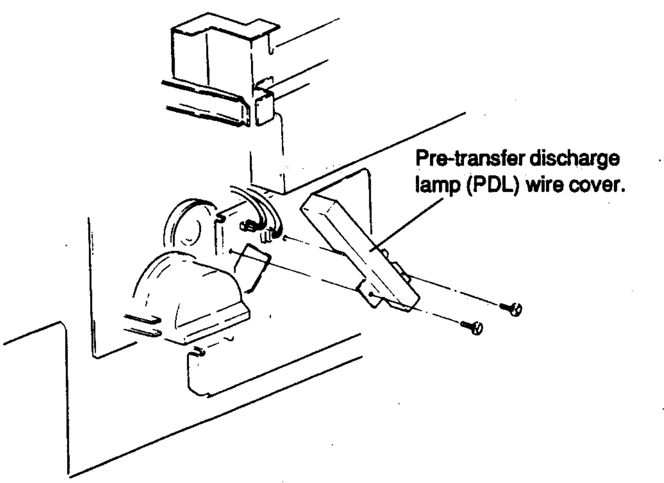
## II. Note

- Carefully protect the TX belt from scratches and foreign materials.

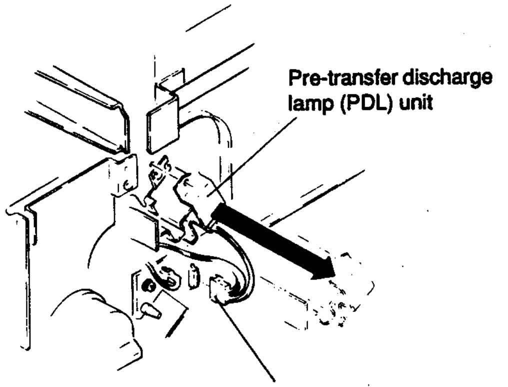
## III. Replacing procedure

**TX belt disassembly**

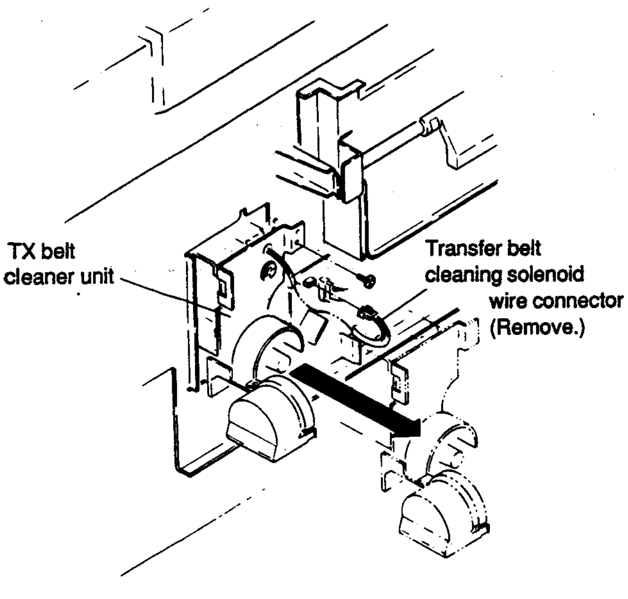
① Remove the pre-transfer discharge lamp (PDL) wire cover.


Pre-transfer discharge lamp (PDL) wire cover.

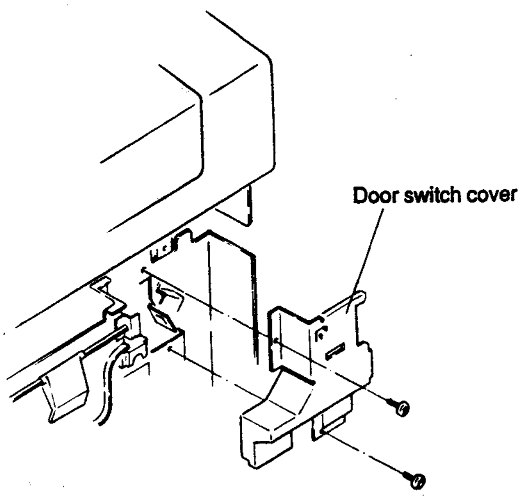
② Remove the pre-transfer discharge lamp (PDL) unit.


Pre-transfer discharge lamp (PDL) unit
Pre-transfer discharge lamp wire connector (Remove.)

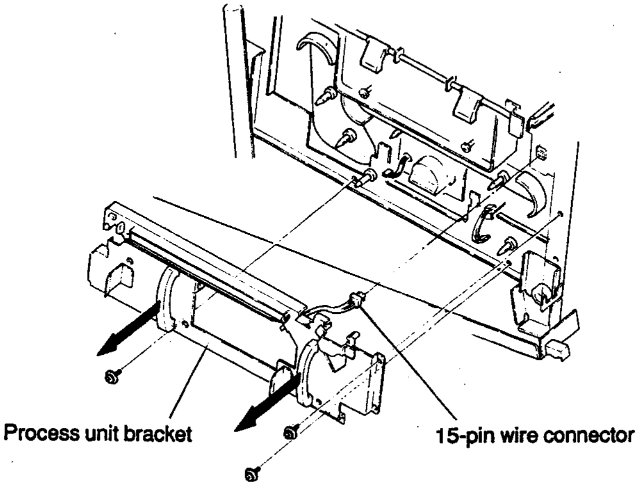
③ Remove the TX belt cleaner unit.


TX belt cleaner unit
Transfer belt cleaning solenoid wire connector (Remove.)

④ Remove the door switch cover.

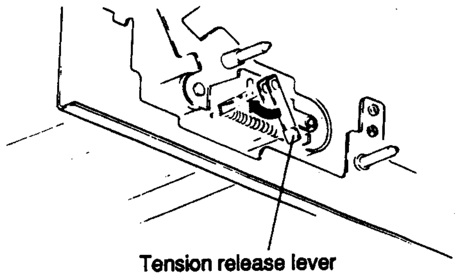

Door switch cover

⑤ Remove the process unit bracket.

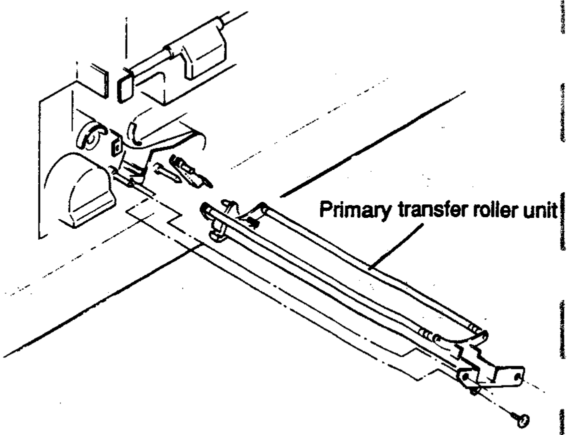

Process unit bracket
15-pin wire connector

⑥ Remove the gamma sensor

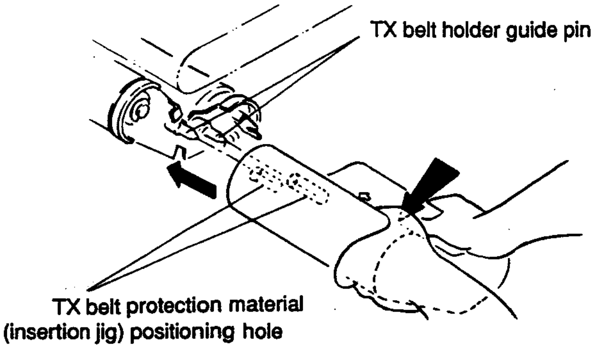
⑦ Release the TX belt tension.


Tension release lever

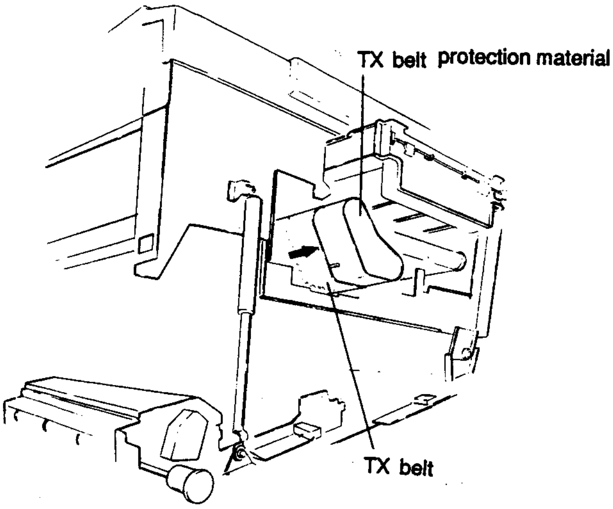
⑧ Remove the primary transfer roller unit.


Primary transfer roller unit

⑨ Remove the TX belt.
(When a used TX belt instead of a new one is reused, remove the TX belt as shown bellow.)
(Align the TX belt protection material positioning hole with the TX belt holder guide pin.)


TX belt holder guide pin
TX belt protection material (insertion jig) positioning hole

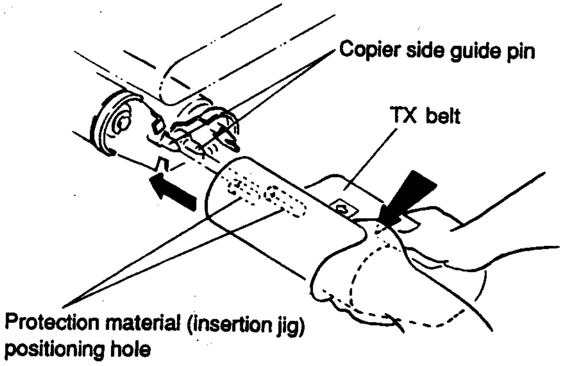
⑩ Hold the TX belt end and pull it out so that the TX belt is slid onto the TX belt protection material.
(Be careful to keep the TX belt from foreign materials and scratches.)


TX belt protection material
TX belt

NOTE: As the TX belt is attached with a black protection sheet, the belt must be mounted together with the protection sheet.

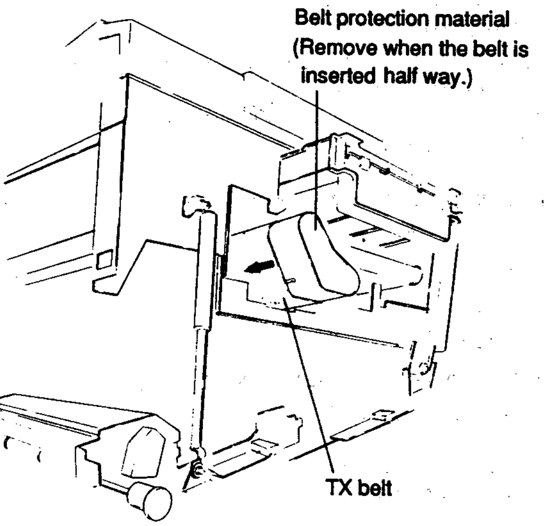
**Installing the TX belt**

① Align the TX belt protection material (insertion jig) positioning hole with the TX belt holder unit guide pin.


Copier side guide pin
TX belt
Protection material (insertion jig) positioning hole

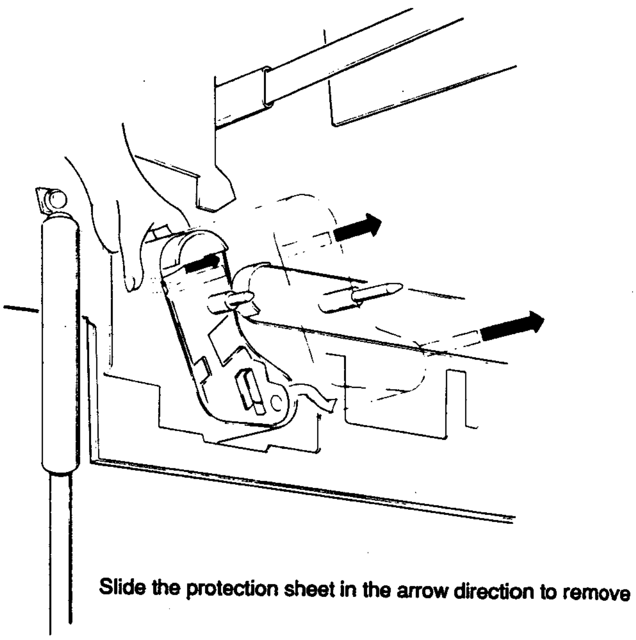
(Note) Be careful of the installing direction of the TX belt. Attach it so that the index hole is to the front frame side.

② Slide the TX belt in the arrow direction halfway. Then remove the protection material, and insert the TX belt until it makes contact with the TX belt holder.


Belt protection material (Remove when the belt is inserted half way.)
TX belt

(Note) When attaching the TX belt, do not remove the black protection sheet from the TX belt.

③ Lightly hold the TX belt and slide the protection sheet in the arrow direction to remove.



Slide the protection sheet in the arrow direction to remove

④ Slide and adjust the TX belt to the front and the rear frame sides so that the front frame side belt edge and the TX belt drive roller end are aligned.

(Note) Be careful to protect the TX belt from dirt and scratches.

⑤ Attach the primary transfer roller.

⑥ Turn the TX belt tension release lever counterclockwise to apply tension to the belt.

(Note)
- When installing the PC belt and the TX belt at the same time, first install the PC belt, then install the TX belt. If the sequence is reversed, installation will not be posible.
- The protection material (insertion jig) and the protection sheet of the PC belt and the TX belt are also used as the belt insertion/removing jig. After installation, they must be saved so that they can be used as servicing jigs.

⑦ Attach the disassembled units.

**TX belt cleaning**

Foreign matters on the TX belt will decrease the transfer efficiency and may cause non-transfer of characters.
In this case, clean the TX belt with a cloth immersed with water.
When cleaning, take great care not to make folds.

## (2) Primary transfer roller cleaning

I. Necessary tools

- Plus screwdriver
- Cloth
- Alcohol

II. Problem caused by improper procedure

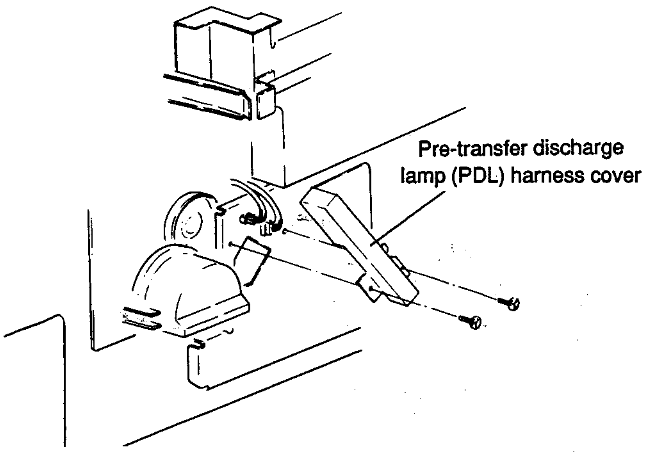
- Poor transfer efficiency
  ↓
  Reduced copy density
  White background

III. Cleaning procedure

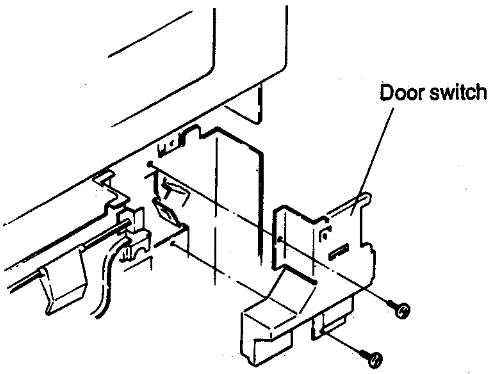
**Primary transfer roller disassembly**

① Remove the waste toner collection bottle.

② Pre-transfer discharge lamp (DL2) wire cover.

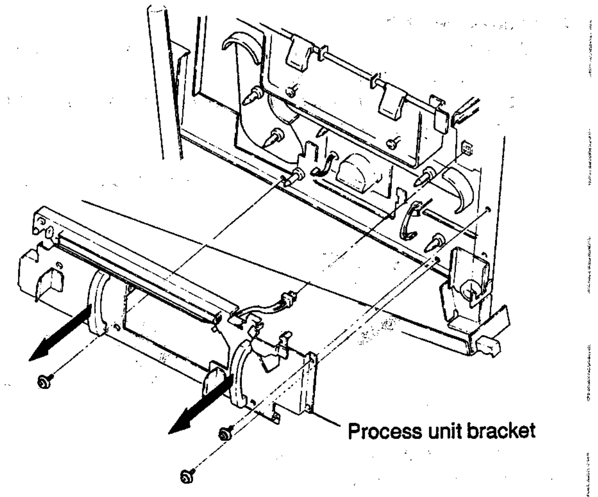

Pre-transfer discharge lamp (PDL) harness cover

③ Remove the door switch cover.


Door switch

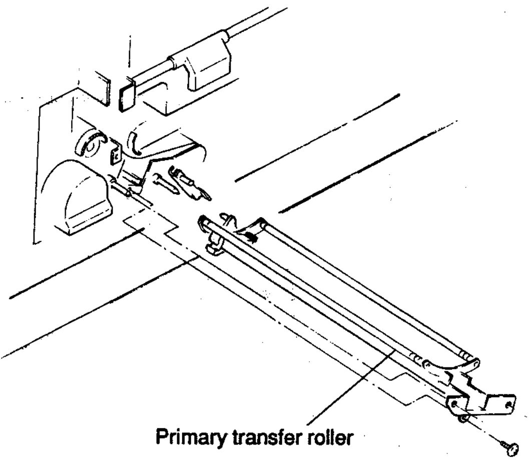
④ Pull out the DV unit holder.

⑤ Remove the process unit bracket.


Process unit bracket

⑥ Release the TX belt tension.

⑦ Remove the primary transfer roller fixing screw and pull out the primary transfer roller.


Primary transfer roller

**Cleaning procedure**

Clean the roller surface with a cloth dampened with alcohol.

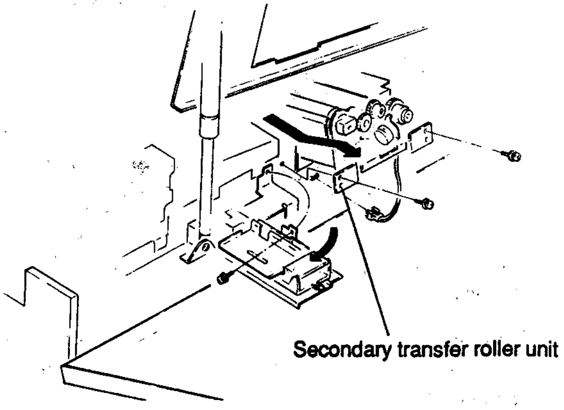
## (3) Secondary transfer roller unit

**Secondary transfer roller disassembly**

① Open the copier body.

② Remove the waste toner collection bottle in the transfer block.

③ Slide the waste toner collection bottle receiver upper unit as shown below.


Secondary transfer roller unit

④ Slide and remove the secondary transfer roller unit to the front frame side.

### a. Transfer roller cleaning

I. Necessary tools

- Cloth
- Alcohol

II. Problem caused by improper cleaning

- Poor transfer efficiency

  ↓

  Reduced copy density
  White background on copy

III. Cleaning procedure

Clean the roller surface with a cloth dampened with alcohol.

### b. Blade replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Cloth

II. Problems caused by improper procedure

- Improper cleaning ← • Blade reversion

  ↓ Roller dirt ↓ Dirty copy

  ↓

  Reduced transfer efficiency

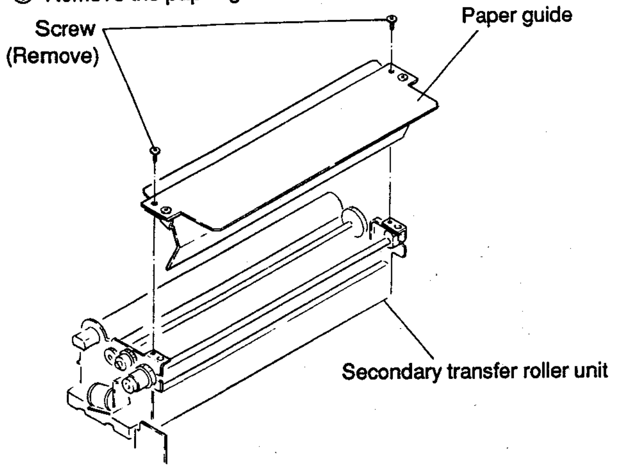
  ↓

  Reduced copy density
  Improper copy color balance
  White or spots on copy
  Uneven copy density

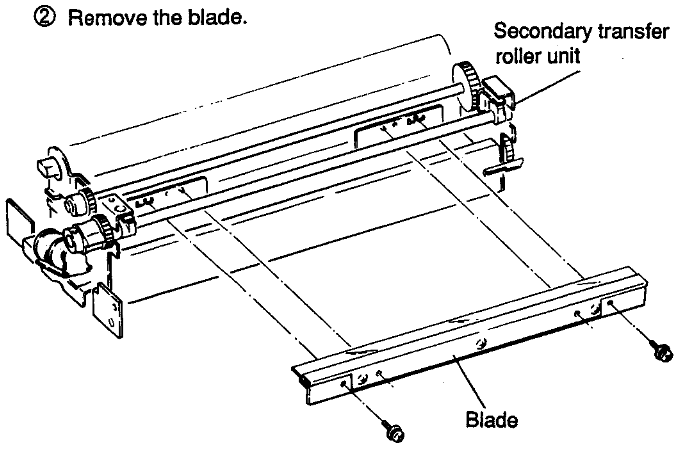
III. Replacement and cleaning

**Blade disassembly**

① Remove the paper guide.


Screw
(Remove)
Paper guide
Secondary transfer roller unit

② Remove the blade.


Secondary transfer
roller unit
Blade

**Blade assembly**

Install a new blade.

(Note) Correctly align the blade positioning hole with the blade mounting plate boss.

**Cleaning procedure**

Clean the blade with a clean cloth.

### c. Shield units F and R replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Cloth
- Vacuum cleaner

II. Problems caused by improper replacement or cleaning

- Toner scatter

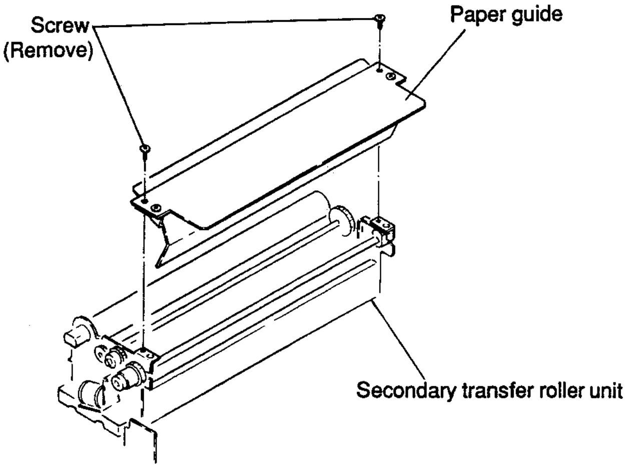
  ↓

  Dirty copy

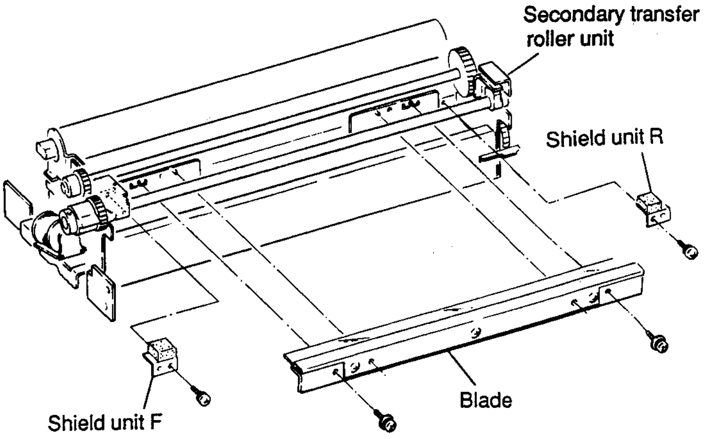
III. Replacement and cleaning procedure

**Shield units F/R disassembly**

① Remove the paper guide.


Screw
(Remove)
Paper guide
Secondary transfer roller unit

② Remove the blade.


Secondary transfer
roller unit
Shield unit R
Shield unit F
Blade

③ Remove the shield units F/R.

**Cleaning procedure**

Clean with a vacuum cleaner.

### d. Discharge unit replacement and cleaning

I. Necessary tools

- Cloth
- Plus screwdriver

II. Note

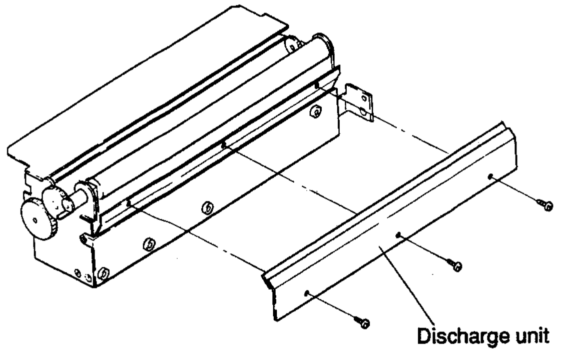
- When replacing the sheet attached to the discharge unit, the whole unit must be changed.
- Do not deform the discharge sheet.

III. Problem caused by improper procedure

- Improper discharge
  ↓
  Improper separation
  ↓
  Improper feeding

IV. Replacement/cleaning procedures

Discharge unit replacement



Discharge unit cleaning

Clean the discharge sheet with a clean cloth.

### e. Waste toner case cleaning

I. Necessary tools

- Cloth
- Plus screwdriver

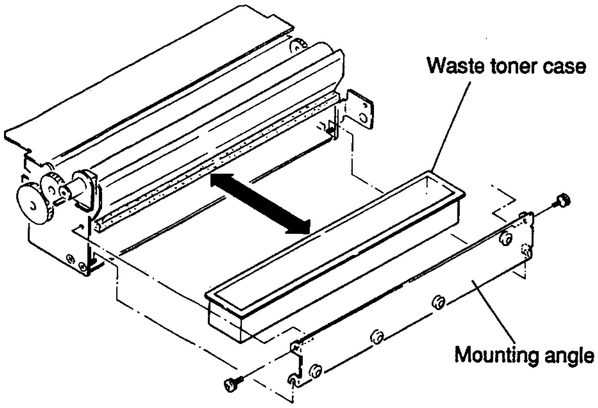
II. Problem caused by improper procedure

- Toner scatter
  ↓
  Dirty copy

III. Cleaning procedure

Waste toner case disassembly

① Remove the angle.

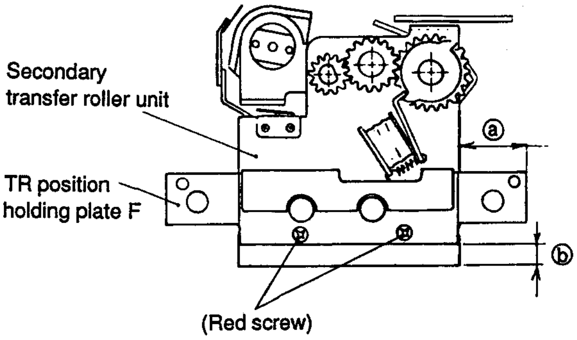


② Remove the waste toner case.

Cleaning procedure

Clean the waste toner case and its surrounding area.

### f. Secondary transfer roller unit assembly



I. TR position holding plate F should not remove (2 red screws).

II. In case of replace the secondary transfer roller unit, procedure as follows.

① Before replace the secondary transfer roller unit, take the measures ⓐ and ⓑ of the TR position holding plate F.

② Before install the new secondary transfer roller unit, to adjust the TR position holding plate F as the same place of replaced unit by 2 red screws.

## (4) TX belt cleaner unit

TX belt cleaner unit disassembly

Refer to page 9-6.

### a. Blade replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Cloth

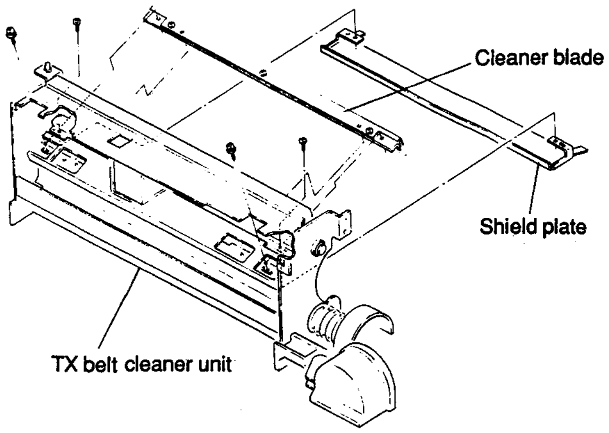
II. Problem caused by improper procedure

- Improper cleaning ← Blade reversion
  - Improper cleaning ↓ Stripes on copy
  - Improper cleaning ↓ Toner scatter ↓ Dirty copy
  - Blade reversion ↓ Transferred image is erased ↓ No copy is made
- Leak (between conduction sheet attached to the cleaner blade and chassis GND)
  ↓
  Blur on copy

III. Replacement and cleaning procedure

Replacement procedure

Remove the sheld plate and replace the cleaner blade.



(Note)
- Fit the blade positioning hole with the blade mounting plate boss.
- Do not deform the conduction sheet pasted on the blade. If the conduction sheet is deformed, blots may occur on the copy image.

Cleaning procedure

① Clean the blade with a lean cloth.

### b. Shield units F/R replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Vacuum cleaner

II. Problem caused by improper procedure

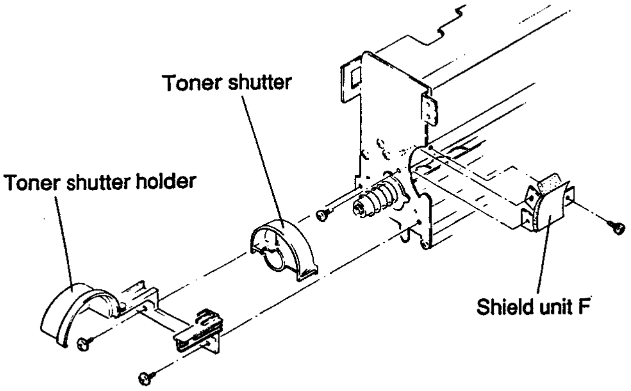
- Toner scatter
  ↓
  Dirty copy

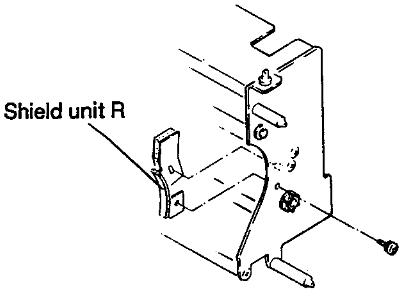
III. Replacement and cleaning procedure

Shield units F/R disassembly

① Remove the blade from the cleaner unit.

② Remove the toner shutter holder.





③ Remove the shield units F/R.

Shield units F/R cleaning procedure

① Clean with a vacuum cleaner.

### c. Shield unit A replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Cloth

II. Note

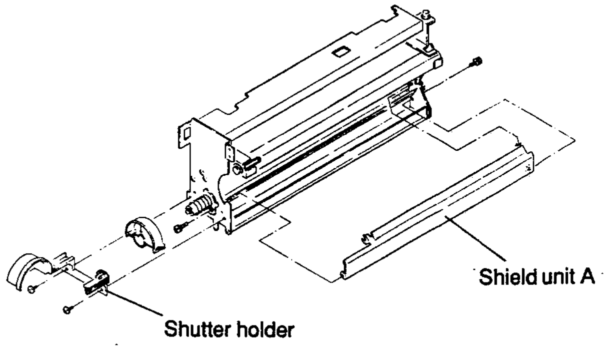
- When replacing the sheet pasted on shield unit A, the whole unit must be replaced.
- Do not deform the sheet.

III. Problem caused by improper procedure

- Toner scatter
  ↓
  Dirty copy

IV. Replacement and cleaning procedure

Shield unit A disassembly)



① Remove shield unit A.

Shield unit A cleaning procedure

① Clean shield unit A with a clean cloth.

### d. Shield sheet replacement and cleaning

I. Necessary tools

- Plus screwdriver
- Cloth
- Vacuum cleaner

II. Note

- Do not deform the shield sheet.

III. Problem caused by improper replacement or cleaning

- Toner scatter
  ↓
  Dirty copy
  Partially thin copy

IV. Replacement and cleaning procedure

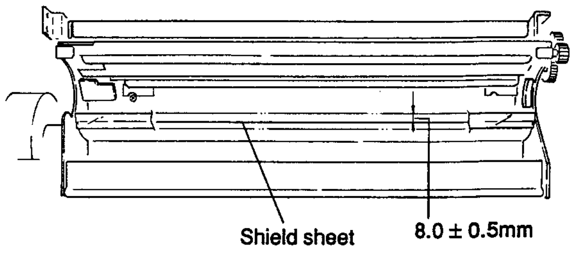
Shield sheet disassembly

① Remove shield unit A.

② Strip off the shield sheet and clean any gum residue with a cloth dampened with alcohol.

Shield sheet attachment

① Attach the shield sheet as shown below.



Shield sheet cleaning

① Clean the shield sheet with a clean cloth.

### e. Toner transport screw replacement

I. Necessary tools

- Plus screwdriver
- Cloth
- Vacuum cleaner

II. Problem caused by improper procedure

- Toner clogging

  ↓

  Cleaner drive system lock → Cleaner drive system gear damage

  ↓

  Toner scatter

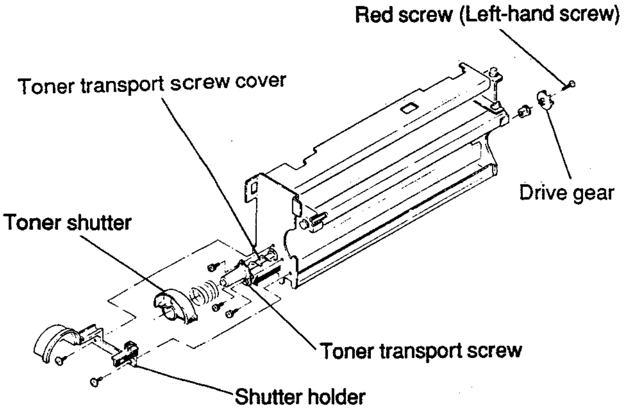
  ↓

  Dirty copy

III. Replacement procedure

Toner transport screw disassembly

① Remove the toner shutter holder.



② Remove the toner transport screw cover.

③ Remove the toner transport screw drive gear.

(Note) Be careful to turn the toner transport screw drive gear fixing screw (red screw) to remove as it is a left-hand screw.

④ Remove the toner transport screw from the front frame side.

## f. TB cleaning roller replacement

I. Necessary tools

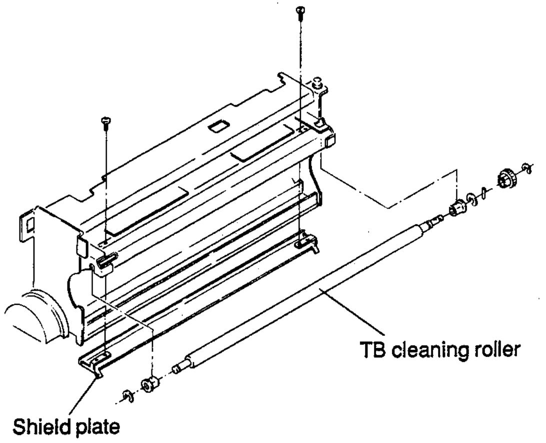
- Plus screwdriver
- Pliers
- Minus screwdriver (small)

II. Problem caused by improper procedure

- TX belt damage

III. Replacement procedure

① Remove the shield plate.



② Remove the TB cleaning roller

## (5) TX belt drive unit

(TX belt drive unit cleaning)

### a. Cleaning of drive roller, tension roller, and pressure roller

I. Necessary tools

- Plus screwdriver
- Cloth
- Alcohol

II. Note

- Use alcohol only. (Do not use other liquid.)
- Do not scratch the roller.

III. Problem caused by improper procedure

- White and black spots on the copy

IV. Cleaning procedure

① Remove the TX belt (the pre-transfer discharge lamp unit, TX belt, cleaner unit, process unit bracket).
(For details, refer to page 9-7.)

(Note) No need to remove the TX belt drive unit.

② Open the copier body.

③ Clean the roller with a cloth dampened with in alcohol.

### b. Drive motor replacement

I. Necessary tools

- Plus screwdriver

II. Problem caused by improper procedure

- Image shift
- Self diagnosis L4 trouble

III. Replacement

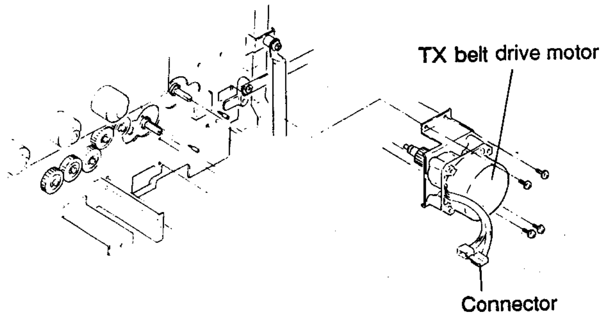
Drive motor disassembly

① Remove the rear upper exterior.

② Open the copier body.

③ Remove the drive motor.

④ Attach the motor gear to a new motor.

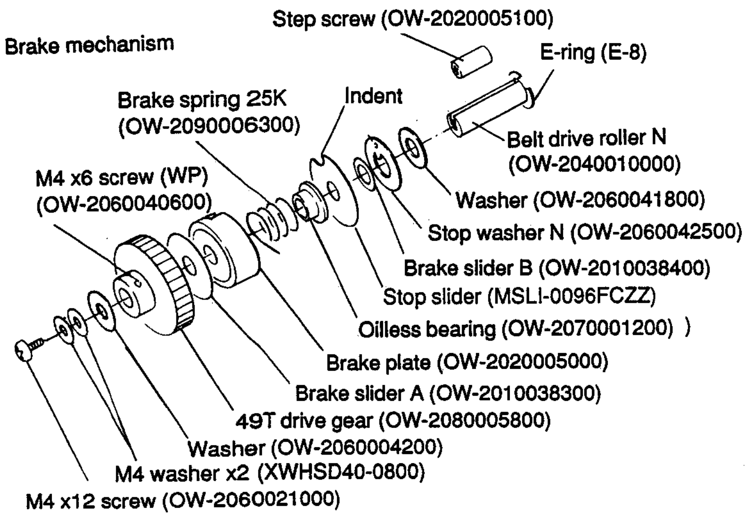


Drive motor installation

Install the drive motor so that there is no gap between the TX belt drive unit gear and the motor gear.

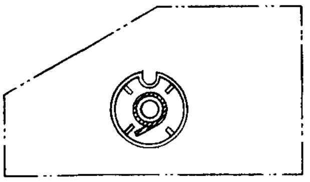
**TX belt drive roller brake unit**

The brake unit is provided only in the transfer drive roller side.


Brake mechanism
Step screw (OW-2020005100)
E-ring (E-8)
Brake spring 25K (OW-2090006300)
Indent
Belt drive roller N (OW-2040010000)
M4 x6 screw (WP) (OW-2060040600)
Washer (OW-2060041800)
Stop washer N (OW-2060042500)
Brake slider B (OW-2010038400)
Stop slider (MSLI-0096FCZZ)
Oilless bearing (OW-2070001200) )
Brake plate (OW-2020005000)
Brake slider A (OW-2010038300)
49T drive gear (OW-2080005800)
Washer (OW-2060004200)
M4 washer x2 (XWHSD40-0800)
M4 x12 screw (OW-2060021000)

Note for assembly

- Refer to the conventional note for assembly.
- Apply enough white grease to the both sides of brake slider A and the both sides of brake slider B. (Mark "*" in the figure.)
- If the arm section of the brake spring 25K is not at the specified position on the brake plate, abnormal sounds may occur. Be careful to that. (Refer to the figure.)



- Insert the mechanism so that the indent in the stop washer faces the front side (the drive gear side). (Refer to the figure.)

## (6) TX belt home position sensor replacement and cleaning

I. Necessary tools
  - Plus screwdriver
  - Cloth

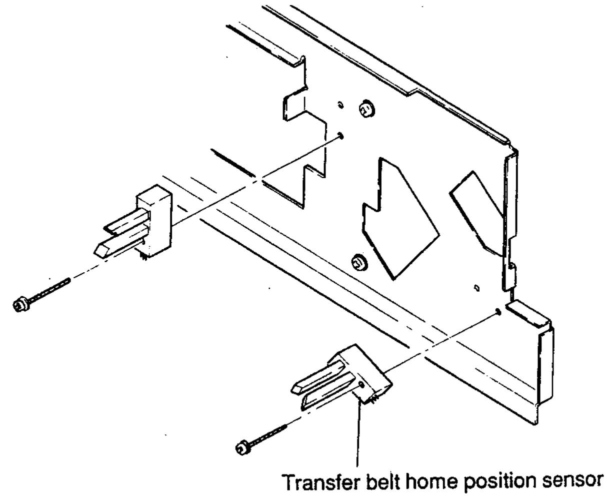
II. Problem caused by improper procedure
  - Image shift
  - Self diagnosis L4 trouble

III. Replacement and cleaning procedure

**TX belt home position sensor disassembly**

① Remove the process mounting fixture (door switch cover, waste toner collecting bottle, connectors).

② Remove the TX belt home position sensor from the process unit bracket.


Transfer belt home position sensor

**Cleaning procedure**

① Clean the light emitting section and the light receiving section of the sensor with a cloth.

## (7) Pre-transfer discharge lamp unit cleaning

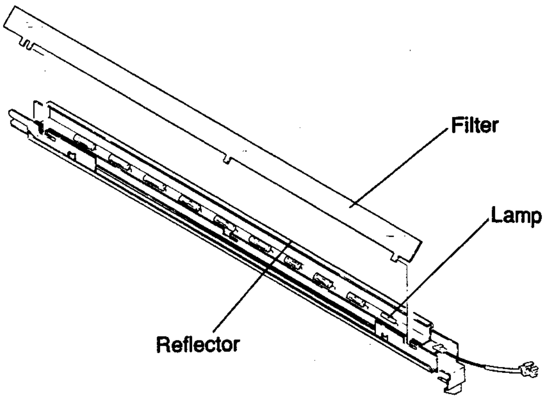
I. Necessary tools
  - Plus screwdriver
  - Cloth

II. Problem caused by improper procedure
  - Reduced discharge efficiency (reduced transfer efficiency)
    ↓
    Reduced copy density
    White stripes on copy
    Uneven exposure of copy

III. Cleaning procedure

① Remove the pre-transfer discharge lamp unit.

② Clean the filter, reflector, and lamp with a clean cloth.


Filter
Lamp
Reflector

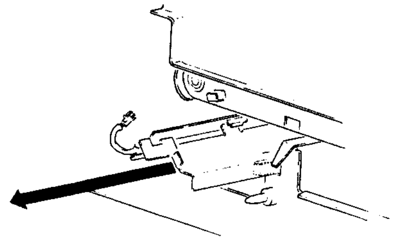
## (8) Gamma sensor cleaning

I. Necessary tools
  - Plus screwdriver
  - Cloth

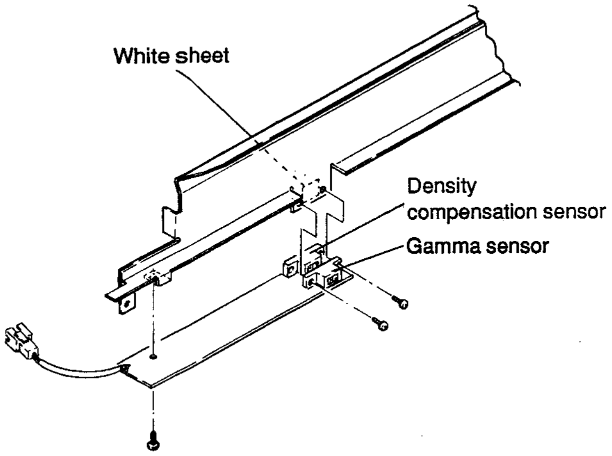
II. Note
  - Cleaning always improve copy quality.
    Make sure you perform clean gamma sensor when Y.M.C. developer replaced.

III. Cleaning procedure

① Remove the process unit bracket and the gamma sensor unit.



② Clean the light emitting and receiving sections of the gamma sensor, the density compensation sensor, and the white sheet with a clean cloth.



## (9) SRHVG replacement

I. Necessary tools

- Plus screwdriver

II. Note

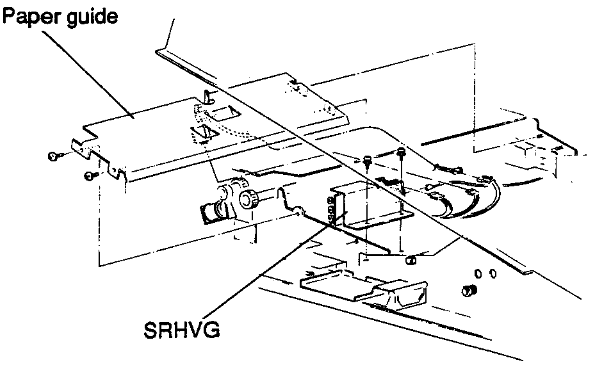
- After replacement of SRHVG, be sure to adjust the secondary transfer roller voltage.

III. Replacement procedure

SRHVG disassembly

① Open the clamshell.

② Remove the paper guide and SRHVG.



# 6. Adjustments

## A. List

The adjustments of the transfer block are as follows:

| Item No. | Contents | Ref. page |
|---|---|---|
| (1) | FRHVG adjustment | 10-13 |
| (2) | SRHVG adjustment | 10-14 |
| (3) | Secondary transfer roller clutch adjustment | 10-15 |
| (4) | Transfer roller cleaner blade cleaning pressure adjustment | 10-16 |
| (5) | TB cleaning roller pressure adjustment | 10-17 |
| (6) | Waste toner full detection level adjustment | 9-19 |
| (7) | Gamma sensor output level adjustment | 10-19 |

## B. Details of adjustments

### (1) Primary transfer roller voltage adjustment (FRHVG)

**I. General**

- Use test command 10 for this adjustment.
- The adjustment should be made for the following 4 modes. The transfer voltage depends on the transfer mode.

| No. | Transfer voltage | Specified voltage | FRHVG adjusting VR |
|---|---|---|---|
| ① | BTHV-A | DC –500±10v | VR-1 |
| ② | BTHV-B | DC –600±10v | VR-2 |
| ③ | BTHV-C | DC –700±10v | VR-3 |
| ④ | BTHV-D | DC –900±10v | VR-4 |

## II. Purpose

The adjustment is performed to adjust the primary transfer roller voltage in each transfer mode to optimize the toner transfer quantity of toner image from the PC belt to the TX belt, obtaining proper color balance of the copy.

The primary transfer roller voltage of each copy mode is determined with the primary transfer roller control signal as shown in the table below:

Full color graphic, monochrome color (graphic, photo), and black-white (graphic, photo) modes.

| Transfer mode | Primary transfer roller voltage control signal | | | | Primary transfer roller voltage |
|---|---|---|---|---|---|
| | $\overline{\text{BTHV1}}$ | $\overline{\text{BTHV2}}$ | $\overline{\text{BTHV3}}$ | $\overline{\text{BTHV4}}$ | |
| Color first layer | L | H | H | H | DC –500V |
| Color second layer | L | H | H | H | DC –500V |
| Color third layer (black-white mode) | H | H | H | L | DC –900V |
| Racing without transfer (when toner is retained) | H | L | H | H | DC –600V |

(Full color phot mode)

| Transfer mode | Primary transfer roller voltage control signal | | | | Primary transfer roller voltage |
|---|---|---|---|---|---|
| | $\overline{\text{BTHV1}}$ | $\overline{\text{BTHV2}}$ | $\overline{\text{BTHV3}}$ | $\overline{\text{BTHV4}}$ | |
| Color first layer | L | H | H | H | –500V |
| Color second layer | L | H | H | H | –500V |
| Color third layer | H | L | H | H | –600V |
| Color fourth layer | H | L | H | H | –600V |
| Color fifth layer | H | H | L | H | –700V |
| Color sixth layer | H | H | H | L | –900V |
| First ~ Fifth layer racing without transfer (when toner is retained) | L | H | H | H | –500V |
| Sixth layer racing without transfer (when toner is retained) | H | L | H | H | –600V |

## III. The adjustment must be performed in the following cases:

- When FRHVG unit is replaced.

## IV. Necessary tools

- Plus screwdriver
- DC high voltage voltmeter (max. measuring voltage DC1000V or more, input impedance 10MΩ or more)
- Small minus screwdriver for adjustment

## V. Problems caused by improper adjustment

[When voltage is too low]

- Insufficient transfer
  ↓
  Insufficient copy density
  Improper color balance

[When voltage is too high]

- Re-transfer on the PC belt
  ↓
  Uneven copy density
  White spots on copy

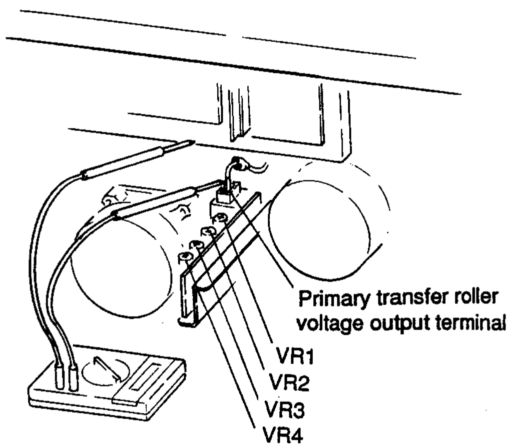
[Imbalance of voltages in transfer modes]

- Improper transfer balance
  (Improper color balance)

## VI. Adjustment procedure

① Remove the rear upper exterior.

② Slide the primary transfer roller voltage output cable terminal protection tube. (Upward to expose terminal)



③ Measure the voltage between the primary transfer roller voltage output cable terminal and the chassis (GND) with the voltmeter.

④ Execute test command 10 (C → O → O → C → 1 → 0 → COLOR PSW).

⑤ Refer to the table below to select the transfer voltage output mode with the paper size select key.

| Lighting developer lamp | Transfer voltage output mode | Specified voltage | FRHVG adjusting VR |
|---|---|---|---|
| Y | BTHV-A | DC –500±10V | VR-1 |
| M | BTHV-B | DC –600±10V | VR-2 |
| C | BTHV-C | DC –700±10V | VR-3 |
| BK | BTHV-D | DC –900±10V | VR-4 |

- The selected transfer voltage output mode is displayed with the developer lamp. (It can be monitored.)

⑥ Depress the COLOR PSW.
The primary transfer roller voltage selected in step ⑤ is supplied for 30 sec.
During execution of the test command, the ready lamp is turned off.
When the paper size select key is pressed during execution of the test command, the test is halted and the machine goes into the transfer voltage output mode stand-by state.

⑦ Check that the primary transfer roller voltage is within the specified range.
If the voltage is not within the specified range, perform step ⑧ to adjust.

⑧ Use test command 10 and adjust the appropriate FRHVG adjusting VR so that the voltage is within the specified range.

## (2) Secondary transfer roller voltage adjustment (SRHVG)

### I. General

- Use test command 11 for this adjustment.
- Adjustment must be made for the following three points.
  The transfer voltage depends on the transfer mode.

| Transfer voltage | Transfer speed | Toner used | Transfer paper kind | Secondary transfer roller voltage |
|---|---|---|---|---|
| PTHV-A | 184mm/sec | 2 or more colors | Plain paper (Length in transport direction 216mm or less) | DC −1.6±0.05KV |
| PTHV-B | 184mm/sec | 1 color | Plain paper | DC −1.4 ±0.05KV |
| | 115mm/sec | 2 or more colors | Plain paper (Length in transport direction 216mm or more) | |
| PTHV-C | 60mm/sec | No relationship | OHP film | DC −2.0± 0.05KV |

### II. Purpose

The adjustment is performed to adjust the secondary transfer roller voltage in each transfer mode to optimize toner transfer from the TX belt to the copy paper, obtaining proper color balance of the copy.

### III. The adjustment must be performed in the following case:

- When SRHVG unit is replaced.

### IV. Necessary tools

- Plus screwdriver
- DC high voltage voltmeter (Max. measuring voltage DC3KV or more, input impedance 10MΩ or more) (Use of a digital multimeter and a high voltage probe is required.)
- Small minus screwdriver for adjustment

### V. Problems caused by improper adjustment

[When voltage is too low]

- Insufficient transfer
  ↓
  Insufficient copy density
  Improper color balance

[When voltage is too high]

- Re-transfer on the TX belt
  (Areas where the toner layer is thin are affected more. For normal paper, insufficient copy density and improper color balance will result. For OHP film, white spots occur in boundary areas of different colors.
- TX belt damage
  ↓
  White background (spots) on copy

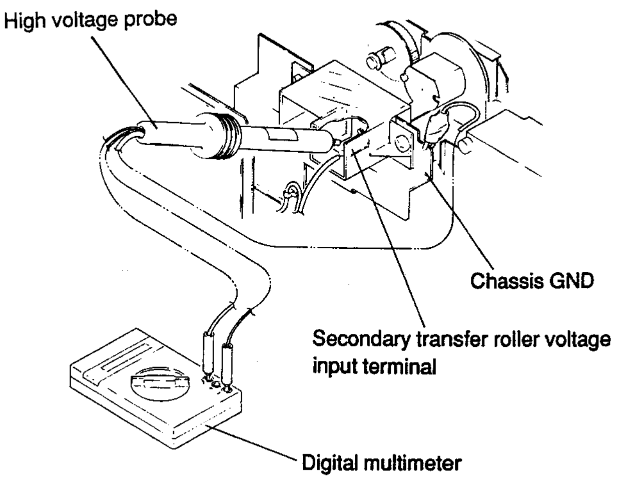
### VI. Adjustment procedure

① Remove the rear lower exterior.

② Open the front exterior.

③ Manually turn on the door switch.

④ Measure the voltage between the secondary transfer roller voltage input terminal and the chassis (GND) with the voltmeter.



⑤ Execute test command 11 (C → 0 → 0 → C → 1 → 1 → COLOR PSW).

⑥ Referring the table below, select the transfer voltage output mode using the numeric key pad.

| Display in copy quantity indicator | Transfer voltage output mode | Specified voltage | SRHVG adjusting VR |
|---|---|---|---|
| 1 | PTHV-A | –DC1.6±0.05KV | VR-A |
| 2 | PTHV-B | –DC1.4±0.05KV | VR-B |
| 3 | PTHV-C | –DC2.0±0.05KV | VR-C |

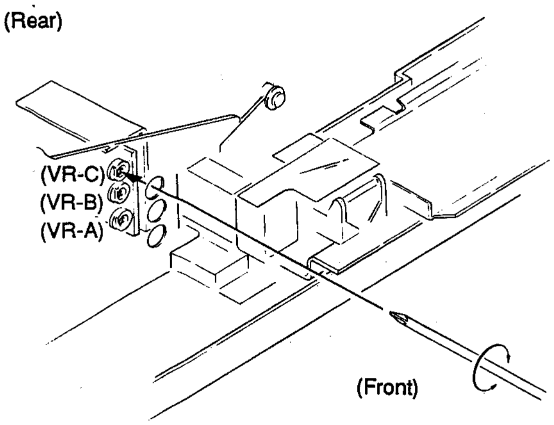
- The selected transfer voltage output mode is displayed in the copy quantity indicator. (It can be monitored.)

⑦ Push the COLOR PSW.
The secondary transfer roller voltage in the mode selected in step ⑥ is supplied for 30 sec.
The ready lamp is turned off during operation of the test command.
When numeric key 1, 2, or 3 is pressed during operation of the test command, the operation is halted and the machine goes into the transfer voltage output mode standby state.

⑧ Check that the secondary transfer roller voltage is within the specified range.

If it is not in the specified range, perform step ⑨ until it is within the specified range.

⑨ Use test command 11 to supply a voltage and adjust the appropriate SRHVG adjusting VR so that the voltage is within the specified range.


(Rear)
(VR-C)
(VR-B)
(VR-A)
(Front)

## (3) Secondary transfer roller clutch adjustment

### I. General

The adjustment is to bring the copy paper and the secondary transfer roller into contact with the TX belt while applying the proper pressure during the secondary transfer operation.
Adjustment is made by adjusting the roller cam position for the clutch.

### II. Purpose

The purpose of the adjustment is to provide maximum transfer efficiency of the toned image from the TX belt to the copy paper. This is to obtain proper density and proper color balance of the copy by maximizing the pressure between the TX belt, the copy paper, and the secondary transfer roller.

### III. The adjustment must be performed in the following cases:

- When the secondary transfer roller unit is disassembled.
- When the clutch is disassembled.
- When the roller cam is removed.

### IV. Necessary tools

- Hex wrench
- Plus screwdriver

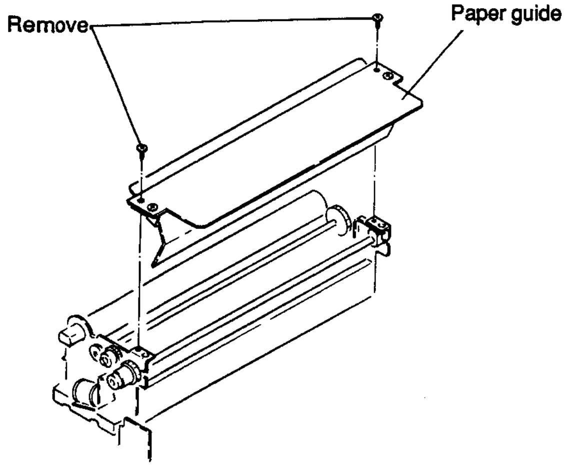
### V. Problem caused by improper adjustment

- Reduced transfer efficiency
  ↓
  Reduced copy density
  Improper color balance

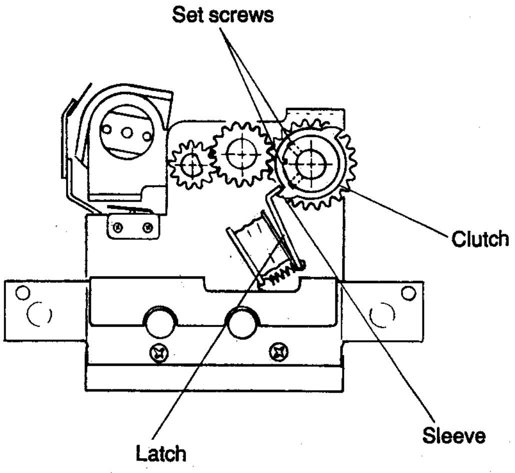
### VI. Adjustment procedure

① Open the copier body.

② Remove the paper guide.

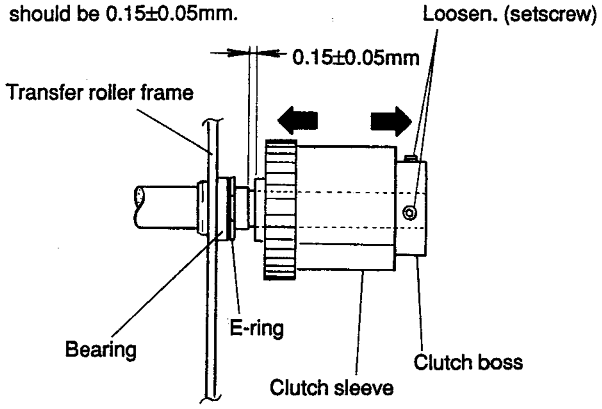

Remove
Paper guide

③ Loosen the clutch boss set screws.

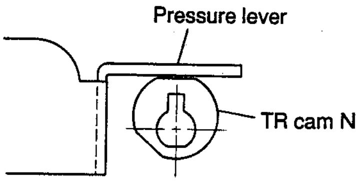

Set screws
Clutch
Latch
Sleeve

④ Turn the clutch sleeve clockwise so that the clutch solenoid hook and the clutch sleeve are as shown in the figure in step ③.

The clutch play in the thrust direction should be 0.15±0.05mm.


Loosen. (setscrew)
0.15±0.05mm
Transfer roller frame
Bearing
E-ring
Clutch sleeve
Clutch boss

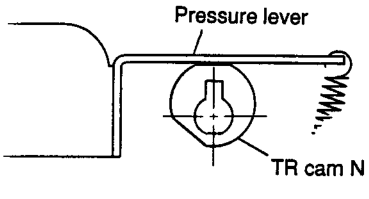
⑤ While maintaining the state in step ④, turn the cam shaft so that the front and rear roller cams and the pressure lever are as shown below:


Pressure lever
TR cam N

⑥ Use test command 39 to confirm that the secondary transfer roller makes on-off operation normally.
(For details, refer to page 8-17.)

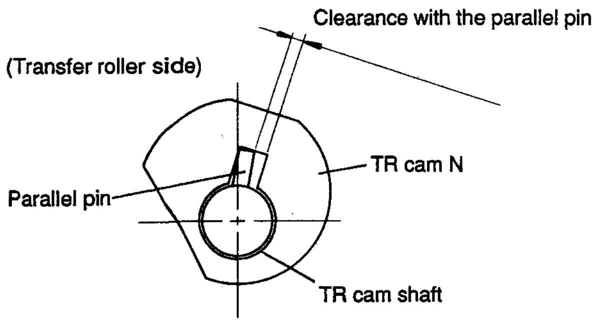
### VII. TR cam N position adjustment

- Loosen the setscrew of the cam clutch unit, and place the cam at position as shown in Fig. 1)-a.

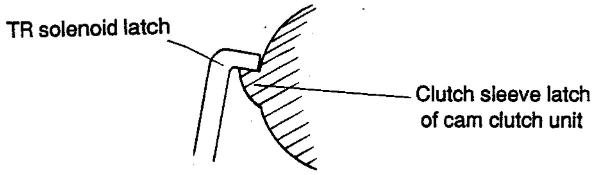

Pressure lever
TR cam N

Note: Fit the XXX section in the figure above with the arm of the TR pressing lever.

- Since there is some looseness between the parallel pin groove and the parallel pin of TR cam N, shift the parallel pin closely to the transfer roller side. (Turn the TR cam shaft counterclockwise.)


Clearance with the parallel pin
(Transfer roller side)
TR cam N
Parallel pin
TR cam shaft

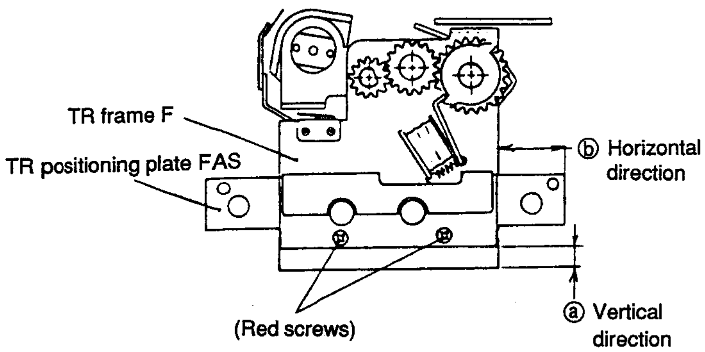
- Check that the solenoid latch of the TR solenoid is securely engaged with the latch section of the clutch sleeve of the cam clutch N.


TR solenoid latch
Clutch sleeve latch of cam clutch unit

- Allow a clearance of 0.15+-0.05mm between the TR washer and cam clutch N (23T gear) end, and fix the two screws.
- Rotate TR cam N one turn to check that the cam returns to the position shown in Fig. 1)-a.

### VIII. Transfer roller unit replacement

[Transfer roller unit]


TR frame F
TR positioning plate FAS
ⓑ Horizontal direction
ⓐ Vertical direction
(Red screws)

[Procedure]

① Before replacement, measure the installation position (dimensions ⓐ and ⓑ in the above figure) of the TR positioning plate FAS.

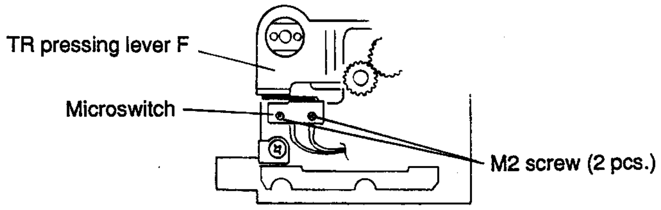
② Loosen the two red screws of new transfer roller, fit the TR positioning plate FAS to the dimensions measured in ①. Tighten the screws to fix.

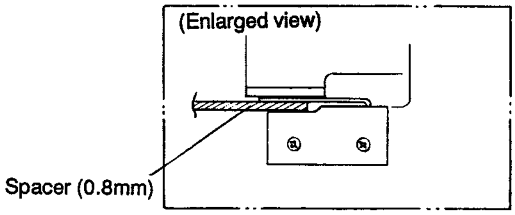
ⓐ Vertical direction ....... Distance from the TR positioning plate FAS edge to the TR frame F edge.

ⓑHorizontal direction..... Distance from the TR positioning plate side to the TR frame F side.

### IX. Microswitch height adjustment

It may requires microswitch height adjustment, when replace the microswitch.


TR pressing lever F
Microswitch
M2 screw (2 pcs.)


(Enlarged view)
Spacer (0.8mm)

- Loosen two M2 screws, insert a spacer (0.8 mm) as shown in the figure, and tighten the screws.

## (4) TX cleaner blade cleaning pressure adjustment

### I. General

The cleaner blade must be applied to the TX belt with the proper pressure. This is controlled by the mounting position of the cleaner blade and the stroke of the cleaner solenoid.

### II. Purpose

The purpose of the adjustment is to assure proper cleaning.

### III. The adjustment must be performed in the following cases:

- When TX belt cleaner unit is disassembled.
- When the cleaner blade mounting plate is disassembled.
- When the cleaning solenoid is disassembled.

### IV. Necessary tools

- Plus screwdriver
- Slide calipers
- Thickness gauge (0.5mm)

### V. Problem caused by improper adjustment

[When cleaning pressure is too low]

- Improper cleaning
  ↓
  Stripes on copy
  Dirty copy

[When cleaning pressure is too high]

Cleaner blade reversion

↓ TX belt damage

↓ Toner image is removed from the TX belt.
↓
No copy is made.

[Others]

- Improper returning operation of shield unit A and cleaner blade (Partially thin copy)

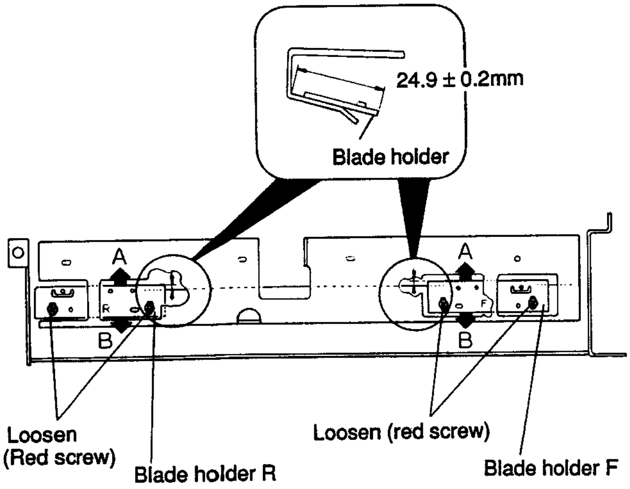
### VI. Adjustment procedure

(Transfer cleaner unit disassembly from the machine (For details refer to page 10-5.)

a. Cleaner blade position adjustment

① Remove the cleaner blade.

② Loosen the blade holder fixing screw (red screw).

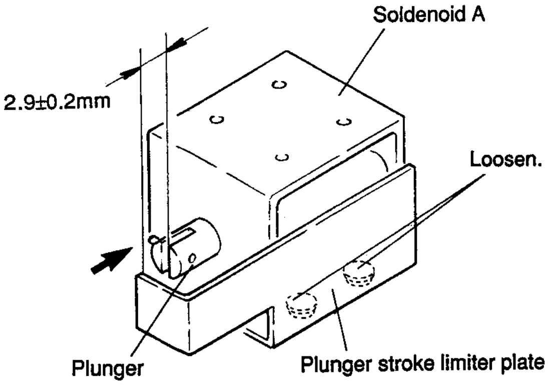


③ Move blade holders F and R in the arrow direction so that blade holders F and R and the blade holder shaft are as shown above. Then tighten the screws.
(The more the blade holder is moved in the direction of arrow A, the greater the cleaning pressure is.)
(The more the blade holder is moved in the direction of arrow B, the smaller the blade cleaning pressure is.)

b. TX cleaning solenoid stroke adjustment

① Remove the cleaning solenoid.

② Loosen the two fixing screws for the plunger stroke limiter plate.



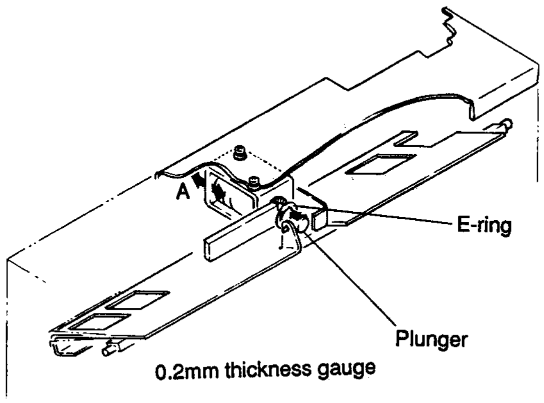
③ Move the plunger stroke limiter plate in the arrow direction so that the distance between the p[lunger stroke limiter plate and the plunger head is 2.9 ±0.2mm when the plunger is pushed fully in the direction of arrow A. (The greater the distance between the plunger stroke limiter plate and the plunger head is, the longer the plunger stroke is and the greater the cleaning pressure is.)
(The smaller the distance between the plunger stroke limiter plate and the plunger head is, the shorter the plunger stroke is and the smaller the cleaning pressure is. When cleaning is not being performed, the distance between the TX belt, shield unit A, and the blade becomes smaller. In some cases, it may always be kept in contact with the TX belt and partially thin copies may be made.)

④ Tighten the plunger stroke limiter plate holding screws.

⑤ Temporarily secure the cleaning solenoid to the cleaner unit.

⑥ Attach the plunger hook to the blade drive lever.

⑦ Insert 0.2mm thickness gauge inside the E-ring, and press the plunger in the arrow direction.



⑧ While maintaining the state obtained in step ⑦, slowly slide the cleaning solenoid in the arrow direction A and stop it until the blade stops. Tighten the cleaning solenoid holding screws.
(When the mounting position of the cleaning solenoid is moved in the direction of arrow A, the cleaning pressure becomes greater. When cleaning is not performed, distance between the TX belt and shield unit A and the blade becomes smaller. In some cases, it may always be in contact with the TX belt, producing partially thin copies.)
(When the mounting position of the blade holder is moved in the direction of arrow B, the cleaning pressure becomes smaller.)

## (5) TB cleaning roller pressure adjustment

### I. General

The adjustment is performed to provide proper TB cleaning roller pressure against the TX belt by changing the cam position for the clutch and the pressure adjusting plate position.

### II. Purpose

The purpose of the adjustment is to completely remove toner adhered to on the TX belt.

### III. The adjustment should be performed in the following cases:

- When the TX belt cleaner unit is disassembled.
- When the TB cleaning roller clutch is removed.

### IV. Necessary tools

- Plus screwdriver
- Hex wrench
- Pliers
- Thickness gauge (0.15mm)

### V. Problems caused by improper adjustment

[When the pressure is too low]

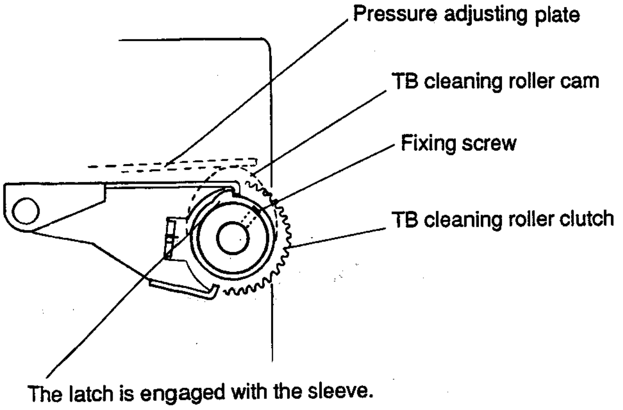
Improper cleaning
↓
Spots on copy

[When the pressure is too high]

TX belt damage
Great friction between TX belt and TB cleaning roller
↓
Copy image shift, color shift

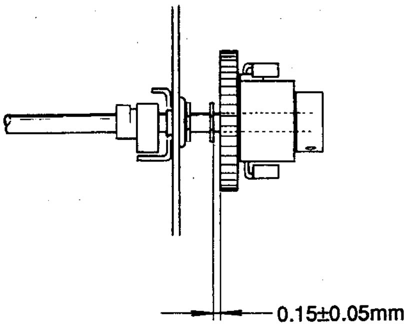
## VI. Adjustment procedure

① Loosen the TB cleaning roller clutch fixing screw.


Pressure adjusting plate
TB cleaning roller cam
Fixing screw
TB cleaning roller clutch
The latch is engaged with the sleeve.

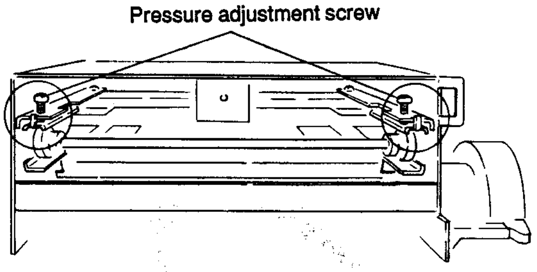
② Set the TB cleaning roller cam as shown in the above figure.

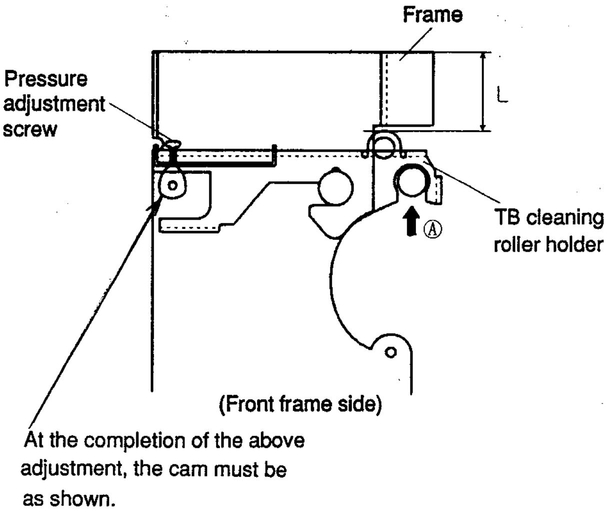
③ Without moving the TB cleaning roller cam, set the TB cleaning roller clutch as shown in the figure in step ①.
Adjust so that the clutch thrust direction play is 0.15±0.05mm.



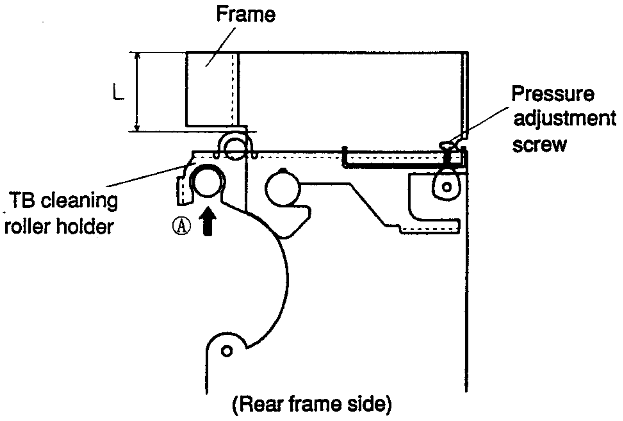
④ While pressing section Ⓐ of the of the TB cleaning roller holder in the arrow direction, adjust the pressure adjustment screw so that distance (L) between the TB cleaning roller holder and the frame is 26.6±0.1mm.

(This adjustment must be performed each of the front and the rear frame sides.)


Pressure adjustment screw


Frame
Pressure adjustment screw
L
TB cleaning roller holder
Ⓐ
At the completion of the above adjustment, the cam must be as shown.

(Front frame side)


Frame
L
Pressure adjustment screw
TB cleaning roller holder
Ⓐ

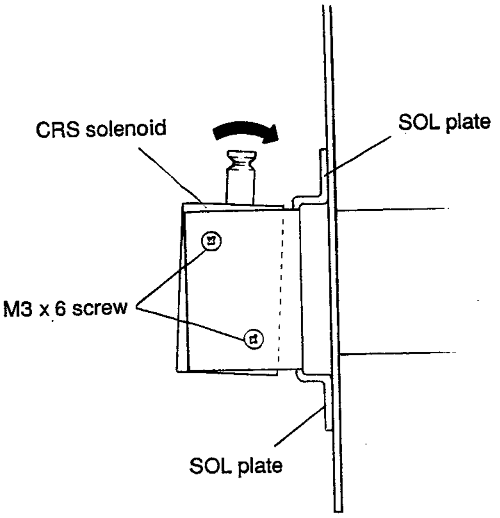
(Rear frame side)

The greater L is, the greater the TB cleaning roller pressure is.
The smaller L is, the smaller the TB cleaning roller pressure is.

### VII. TB cleaning roller solenoid adjustment

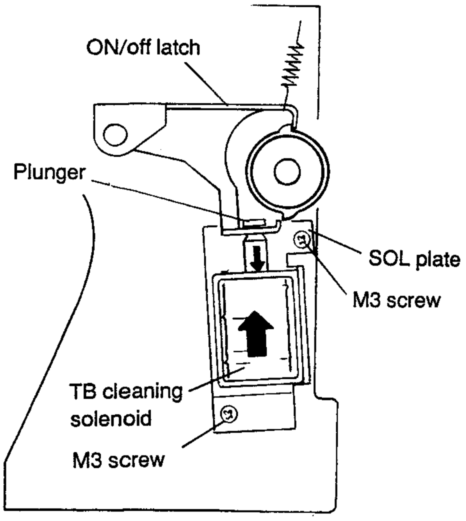
TB cleaning solenoid installation

Hold to the solenoid plate as shown in the figure below, turn it fully to the end of the allowance, and fix with screws.



TB cleaning roller solenoid position adjustment

With the TB cleaning roller solenoid in pressed state, lift the TB cleaning roller solenoid upward and fix the two red screws of the solenoid plate.



NOTE; Use test command 37-1 to check the TB cleaning roller operation. (check the ON/OFF operations are made periodically.)

## (6) Waste toner full detection level adjustment (See page 9-19)

## (7) Gamma sensor output level adjustment

### I. General

The LED conduction current and the photo transistor output voltage are adjusted to optimize the gamma sensor operation point (where dynamic range is maximum without saturation).

### II. Purpose

The purpose of the adjustment is to assure accurate gamma correction.

### III. The adjustment must be performed in the following case:

- When the gamma sensor PWB is replaced or when any part in the gamma correction sensor PWB is replaced.

### IV. Notes

- Digital multimeter
- Small plus screwdriver for adjustment

### V. Note

- Do not project light onto the gamma sensor. (Do not perform in a light place.)
- The adjustment of the gamma sensor must be made when setting new Y, M, and C developer sensor output level.
  When replacing developer other than black, always replace all three color developers (Y, M, and C).
  If this adjustment is performed without setting new developers, the following troubles may occur.
- Gamma sensor trouble
  (Thin copy)
  (Thick copy)
  (Improper copy color balance)
  (Background copy)
- After this adjustment, the following items must be performed:
  (Gamma sensor reference level setting) (For details, refer to page 3-16.)
  (Gamma correction)
  (For details, refer to page 4-2.)

### VI. Problem caused by improper adjustment

[When the gamma sensor output level is too high]

Reduced copy density

Abnormal copy color balance

[When the gamma sensor output level is too low]

Too high copy density

Abnormal color balance

Background copy

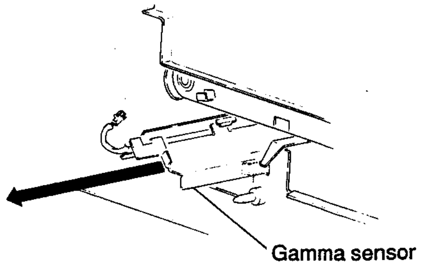
### VII. Adjustment procedure

① Set new Y, M, and C developers.

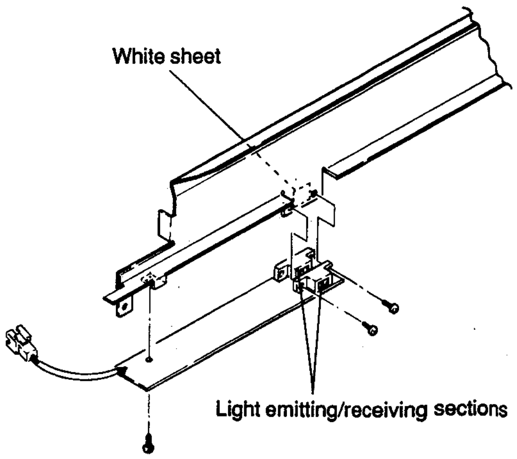
② Open the front exterior.

③ Remove the process unit bracket.

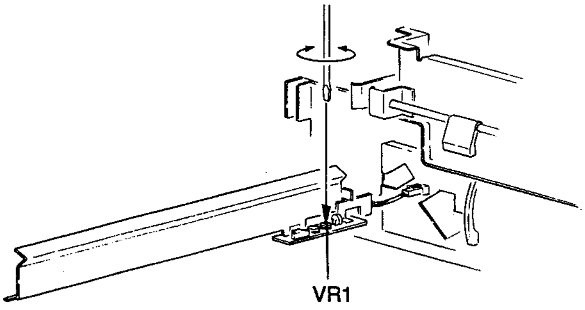
④ Remove the gamma sensor.



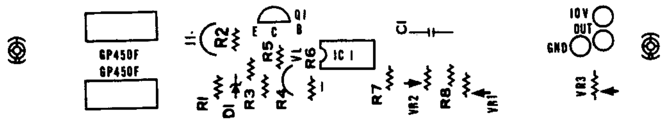
⑤ Clean the gamma sensor light emitting section, the light receiving section, and the white sheet.



⑥ Reinstall the gamma sensor.



⑦ Turn on the power switch, close the front exterior.

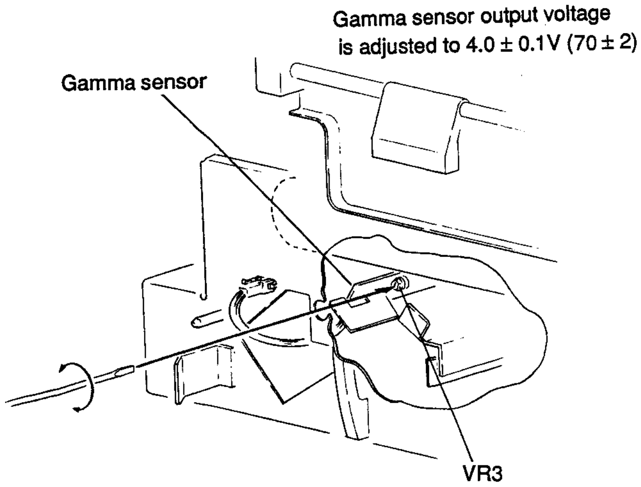


⑧ Execute test command 66
(C → 0 → 0 → C → 6 → 6 → COLOR PSW)

(Note) Be sure the front cabinet is closed as external light will affect the gamma sensor output level monitored in test command 66.

- A yellow toned image is formed on the transfer belt.
- When the yellow toned image on the transfer belt comes to the gamma sensor position, the transfer belt is stopped.
- The gamma sensor output level is displayed in the copy quantity display.

⑨ Turn the gamma sensor PWB VR3 adjust the gamma sensor output level to 70±2. This displayed value is equivalent to an output at check pin VL of 4.0 VDC ±0.1 VDC. If the proper output cannot be obtained, proceed to step ⑪.


Gamma sensor output voltage
is adjusted to 4.0 ± 0.1V (70 ± 2)
Gamma sensor
VR3

(Note) The allowance of the gamma sense output level is 70±10. If the gamma sensor output level is in that range, no adjustments are required in normal case.
When adjusting, adjust with the allowance of 70±2 with consideration on the operation margin.

⑩ If the value of 70±2 cannot be obtained, remove the process angle. Then, perform the following procedure.

**[When the adjustment value does not fall to 70 ±2]**

① Turn VR1 15 degrees clockwise.

② Attach the gammer sensor and process angle.

③ Adjust VR3 so that the gammer sensor output level becomes 70±2.

④ If the above procedure ③ dose not work, repeat procedures ① to ③.

**[When the adjustment value does not rise to 70±2]**

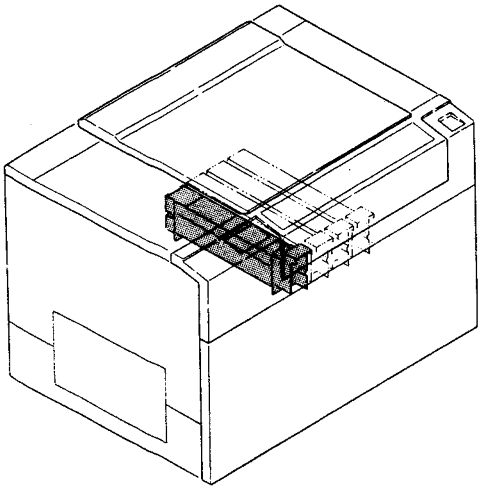
① Turn VR1 15 degrees counterclockwise.

② Attach the gammer sensor and process angle.

③ Adjust VR3 so that the gammer sensor output level becomes 70±2.

④ If the above procedure ③ does not work, repeat procedures ① to ③.

# [11] DEVELOPER/TONER SUPPLY BLOCK



## 1. General

The developer/toner supply block consists of the toner stirring spring, toner supply roller, developer roller, transport roller, stirring roller, developer shutter unit, doctor blade, toner concentration sensor, developer drive units, and the developing bias voltage generator unit.

A static charged latent image formed on the PC belt is converted into a visible image using toner.

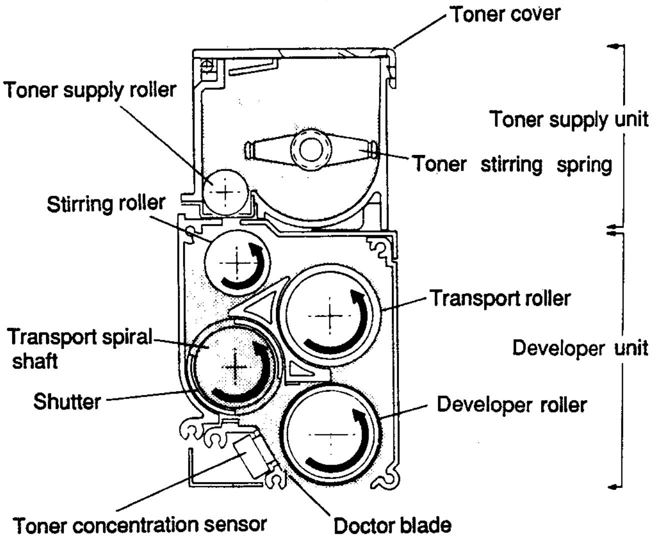
In order to avoid mixing with other colors, toner and developer are laid over the developer roller only when the image is developed.

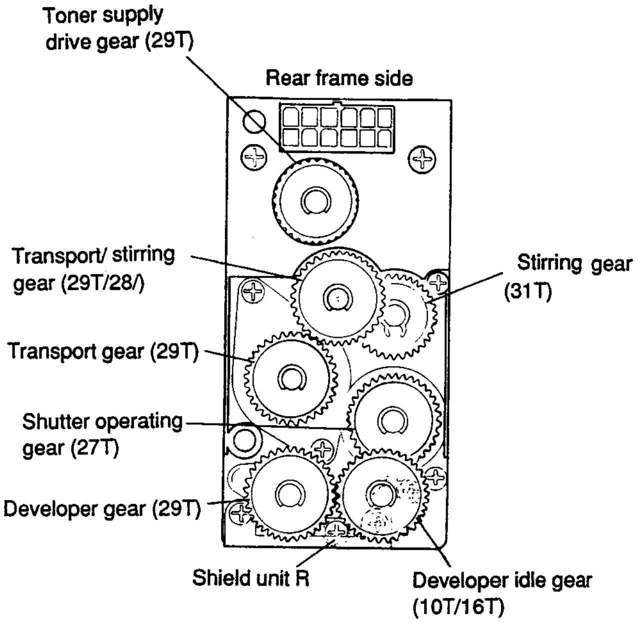
The developer unit and the toner supply unit are assembled on one body, and there are four kinds of developer units; yellow, magenta, cyan, and black.

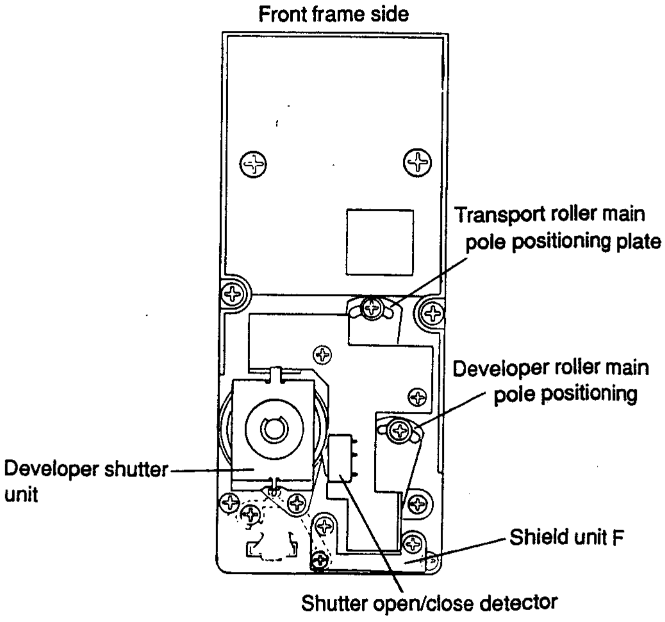
## 2. Specification

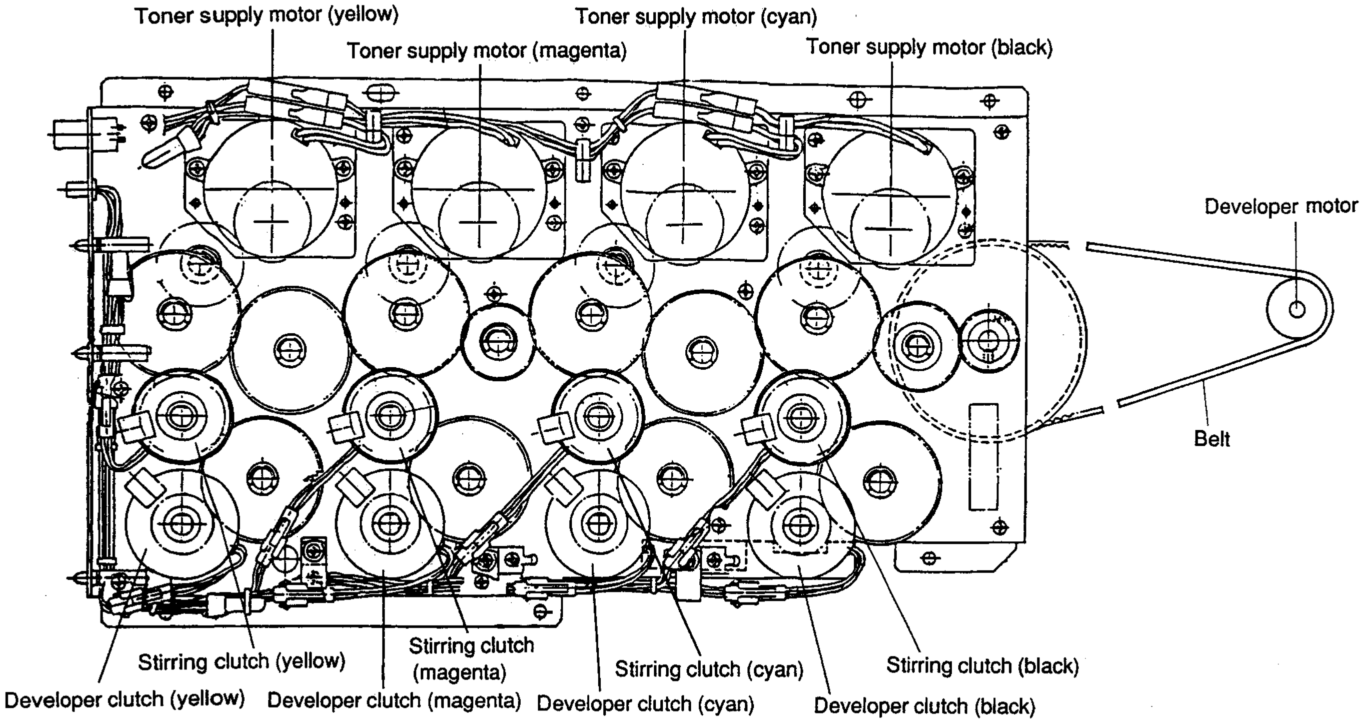
| | |
|---|---|
| • Developing method | Counter rotation (with respect to the PC belt moving direction) magnetic brush developing. |
| • Toner concentration sensing method | Magnetic sensor |
| • Toner box capacity | 200 grams, maximum |
| • Developing bias | DC–60/–80/–100V (3 modes) |
| (Developer) | |
| • Material | Iron powder carrier |
| • Charge method | Negative charge by means of Bias Voltage |
| • Life | Color 10K copies<br>Black/white 20K copies |
| (Toner) | |
| • Charge method | Positive charge by means of friction |

## 3. Construction


Toner cover
Toner supply roller
Toner supply unit
Toner stirring spring
Stirring roller
Transport roller
Transport spiral shaft
Developer unit
Shutter
Developer roller
Toner concentration sensor
Doctor blade


Toner supply drive gear (29T)
Rear frame side
Transport/ stirring gear (29T/28/)
Stirring gear (31T)
Transport gear (29T)
Shutter operating gear (27T)
Developer gear (29T)
Shield unit R
Developer idle gear (10T/16T)


Front frame side
Transport roller main pole positioning plate
Developer roller main pole positioning
Developer shutter unit
Shield unit F
Shutter open/close detector


Toner supply motor (yellow)
Toner supply motor (magenta)
Toner supply motor (cyan)
Toner supply motor (black)
Developer motor
Belt
Stirring clutch (yellow)
Stirring clutch (magenta)
Stirring clutch (cyan)
Stirring clutch (black)
Developer clutch (yellow)
Developer clutch (magenta)
Developer clutch (cyan)
Developer clutch (black)

## 4. Major components and functions

### (1) Toner stirring spring

At the same time the toner is stirred, the toner is sent onto the toner supply roller.

### (2) Toner supply roller

The toner in the supply unit is supplied to the developer unit.

### (3) Stirring roller

Developer and toner in the developer unit are stirred for even mixture. The toner is charged positive and the carrier negative.

### (4) Developer shutter unit

#### a. Developer shutter

Used to control the flow of developer to the developer roller.

The shutter opens before the developing takes place and the developer at the stirring roller area is carried to the developer roller via the transport spiral shaft.

The shutter closes when developing completes to stop the flow of developer from the stirring roller, and the developer on the developer roller is removed by the transport roller.

#### b. Developer shutter clutch unit

A spring clutch is used to open and close the developer shutter, which is controlled by the clutch solenoid.

Action of the clutch solenoid is controlled by the main PWB. Each time the clutch solenoid is operated, the shutter will open or close.

#### c. Transport spiral shaft

Used to transport developer through the developer shutter.

### (5) Developer shutter open/close detector

Used to detect open/close of the developer shutter.

An active state signal is issued to the main PWB when an open shutter condition is detected.

### (6) Developer roller

Developer brush is formed on this roller. While the roller is rotating, toner is attracted (developed) to the latent image on the photoconductor belt.

Four-pole magnets inside the developer roller attract the developer to the surface of the developer roller to form the developer brush.

The developer roller rotates while developing, and developer is supplied constantly to supply toner to the developer roller.

### (7) Transport roller

Used to carry the developer on the developer roller onto the stirring area.

Six-pole magnets positioned inside the transport roller attract the developer from the surface of the developer roller.

### (8) Doctor blade

Employed to regulate developer supplied from the shutter to the developer roller at an optimum rate.

### (9) Toner concentration sensor

Used to detect the toner concentration of the developer in the developer roller area.

LOW level (0V) of the sensor signal is sent to the main PWB when the concentration of the toner drops below the prescribed level and the TONER EMPTY lamp comes active. With this the toner supply motor starts to run.

The toner concentration sensor level is automatically adjusted by the test command 25.

## (10) Developer drive units

### a. Toner supply motor

A synchronous motor is employed to drive the toner stirring spring and the toner supply roller to feed toner from the toner box to the developer unit.

This motor is controlled by the toner motor drive PWB.

### b. Stirring clutch

Used to control rotation of the transport roller and the stirring roller.

The clutch is controlled by the main PWB.

### c. Developer clutch

Used to control rotation of the developer roller, transport spiral shaft, and the developer shutter.

The clutch is controlled by the main PWB.

### d. Developer motor

An AC induction motor is employed to drive the developer unit.

## (11) Developing bias voltage/main corona voltage generator unit (DVBG/MHVG)

Used to apply negative DC bias potential to the developer roller.

(Function of the developing bias voltage)

- Used to prevent appearance of background caused by residual potential in the photoconductor.
- Used to select copy density in the graphic and photo copy modes.

| Operating mode | Developing bias voltage |
|---|---|
| Graphics mode | DC –100V |
| Photo mode | DC –80V |
| Warmup (stirring period) | DC –60V |

As three kinds of bias voltages are provided, one of these will be selected by the main PWB according to the operating mode.

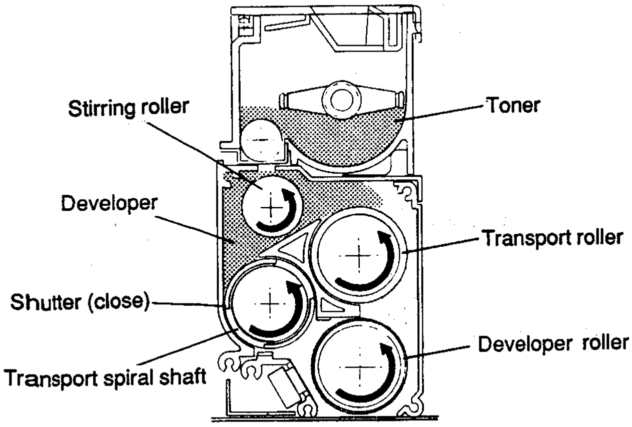
## 5. Operation

**Step 1**

Developer motor starts and the developing bias voltage comes active.

**Step 2**

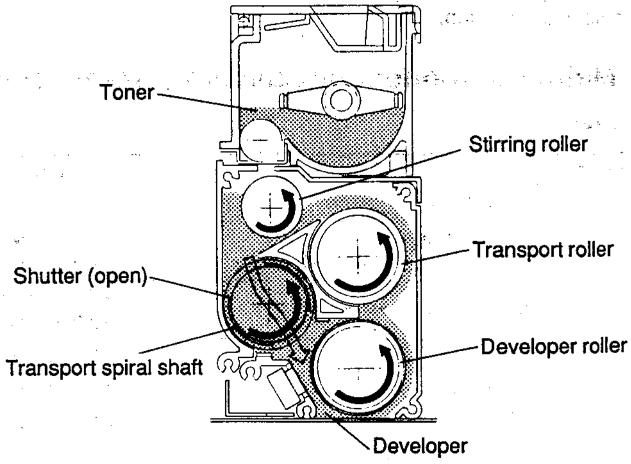
The stirring clutch and the developer clutch turn on to rotate the transport roller, stirring roller, developer roller, and the transport spiral shaft. Developer is stirred to have the toner changed positive and the carrier negative.


Stirring roller
Toner
Developer
Transport roller
Shutter (close)
Developer roller
Transport spiral shaft

**Step 3**

The shutter opens when the developer shutter clutch solenoid is energized.

The developer at the stirring roller is transported to the developer roller.


Toner
Stirring roller
Transport roller
Shutter (open)
Developer roller
Transport spiral shaft
Developer

**Step 4**

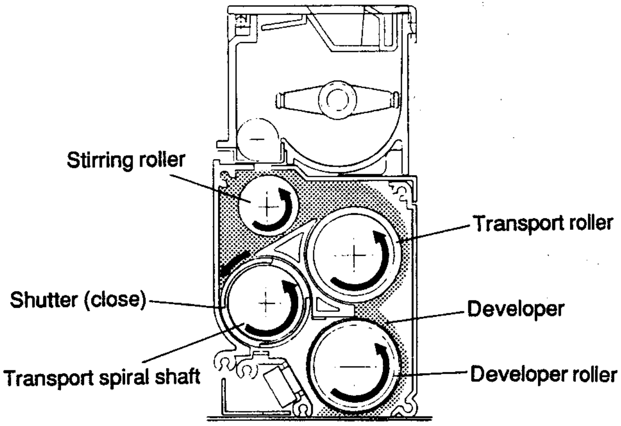
Development of the latent image takes place.

(The positive charged toner is attracted to the negative charged latent image on the photoconductor belt to form a visible image.)

**Step 5**

The developer shutter closes when the shutter clutch solenoid energizes again.

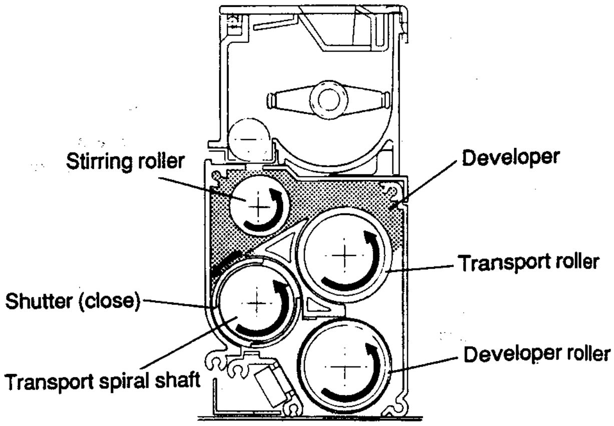
The developer transport routes between the stirring roller and the developer roller are closed.


Stirring roller
Transport roller
Shutter (close)
Developer
Transport spiral shaft
Developer roller

**Step 6**

The developer clutch is de-energized and the developer roller and transport spiral shaft stop rotating.

The developer on the developer roller is removed by the transport roller and carried to the stirring area.


Stirring roller
Developer
Transport roller
Shutter (close)
Developer roller
Transport spiral shaft

**Step 7**

The stirring clutch de-energizes and the rotation of the transport roller and stirring roller stop.

# 6. Major component disassembly, re-assembly, replacement, cleaning

## A. List

| Item No. | Parts name | | When replacement required | When cleaning required | Ref. page |
|---|---|---|---|---|---|
| (1) | Developer | | | | 11-4 |
| | a | Color developer (Yellow, Magenta, Cyan) | When Y, M, or C developer counter exceeds 10,000 (DV lamp lights up). | | |
| | b | Black developer | When BK developer counter exceeds 20,000 (DV lamp lights up). | | |
| (2) | Shield unit, F | | At maintenance (Every 120K copies) | At every maintenance | 11-5 |
| | Shield unit, R | | At maintenance (Every 120K copies) | At every maintenance | 11-5 |
| (3) | Shield felt, FRa | | At maintenance (Every 120K copies) | At every maintenance | 11-6 |
| | Shield felt, FRb | | At maintenance (Every 120K copies) | At every maintenance | 11-6 |
| (4) | Shield felt, A<br>Shield felt, B | | At maintenance (Every 120K copies) | At every maintenance | 11-6 |
| (5) | Shield sheet, B (yellow DV unit only) | | At maintenance (Every 120K copies) | At every maintenance | 11-6 |
| (6) | Stirring roller | | | | 11-7 |
| (7) | Developer roller | | | | 11-8 |
| (8) | Transport roller | | | | 11-8 |
| (9) | Developer shutter unit | | | | 11-9 |
| (10) | Shield sheet A | | At maintenance (Every 120K copies) | At every maintenance | 11-10 |
| (11) | Toner concentration sensor | | | | 11-10 |
| (12) | Toner supply motor | | | | 11-10 |
| (13) | Stirring clutch | | | | 11-11 |
| (14) | Developing clutch | | | | 11-11 |
| (15) | Developing motor | | | | 11-11 |
| (16) | DVBG/MHVG | | | | 11-12 |
| (17) | Toner supply roller | | | | 11-12 |

## B. Procedure

## (1) Developer replacement

### I. Tools required

- Plus screwdriver
- Lintfree cloth
- Vacuum cleaner

### II. Note

- Do the following after the developer has been replaced.

① Reset the developer counter. (Refer to page 18-18)

② Toner density sensor sense level adjustment.

③ Program the gamma reference level. (Refer to page 3-16)

④ Perform gamma correction. (Refer to page 4-2)

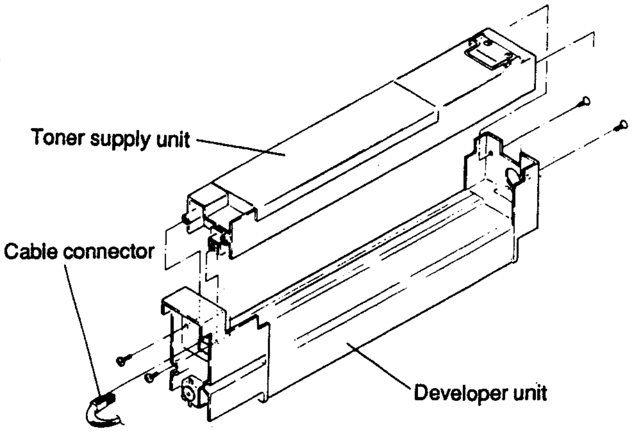
⑤ Adjust copy quality. (Refer to page 4-1)

- Do not allow dust to attach to the developer roller.
  (The developer unit must be placed on a sheet of paper.)
- All color developers must be replaced together when any one of them is in need of replacement. (Never replace color developer individually.)
  [Problem caused by improper procedure]
  (Color balance distortion)
- Since four toner supply units are separately provided for each developer unit, you must install them with care. All toner supply units have their own connector cable wiring.
- The magenta developer unit has the same structure as the cyan developer unit, all other developer units have different structure.
  [Problem caused by improper procedure]
  (Flashing SA status error)
  (Occurrence of abnormal color copy made)
- Use the proper developer unit for each particular developer color.
  [Problem caused by improper procedure]
  (Occurrence of abnormal color copy made)
  Color indication is active for the toner supply unit and developer unit at the same time.

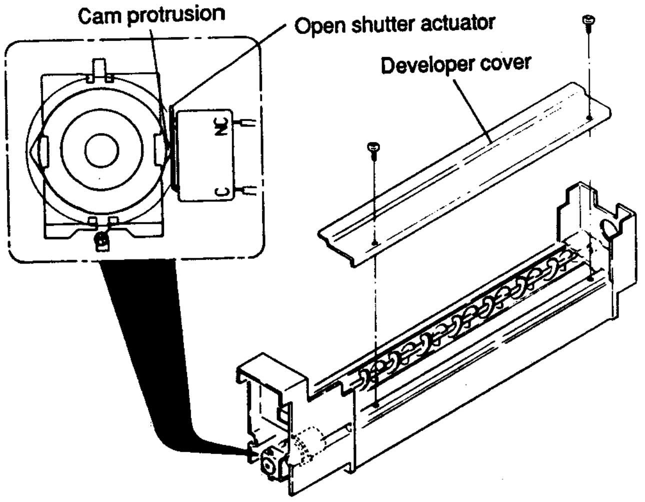
### III Replacement procedure

(Developer removal)

① Remove the toner supply unit.



② Remove the developer cover.

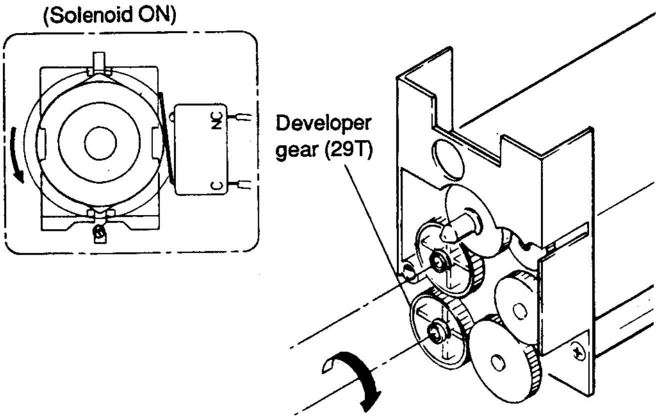

Cam protrusion
Open shutter actuator
Developer cover
NC
C

③ Open the developer shutter.
(Manually actuate the developer shutter clutch solenoid.)
(Rotate the developer feed gear in the arrowhead direction until the protrusion of the shutter clutch cam pushes the actuator of the shutter open/close detector, and the switch is turned on.

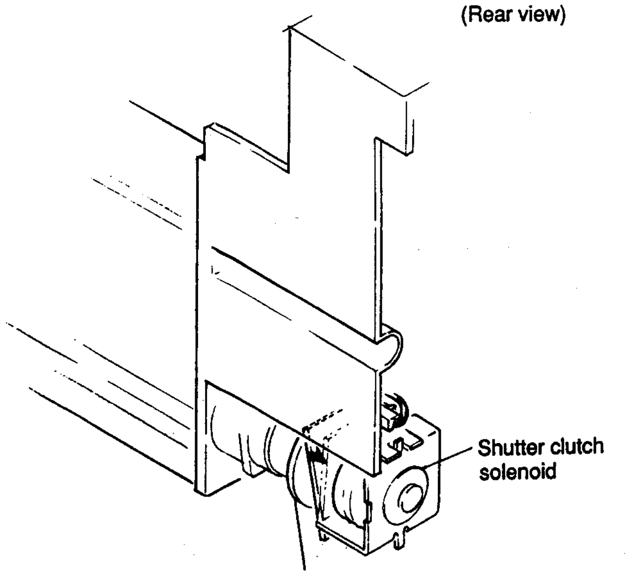
(Note)

With the developer shutter closed, the developer cannot be removed from the developer unit.

(Solenoid ON)


NC
C
Developer gear (29T)

(Rear view)


Shutter clutch solenoid
Manually turn on

④ Invert the developer unit over an empty wastebasket.

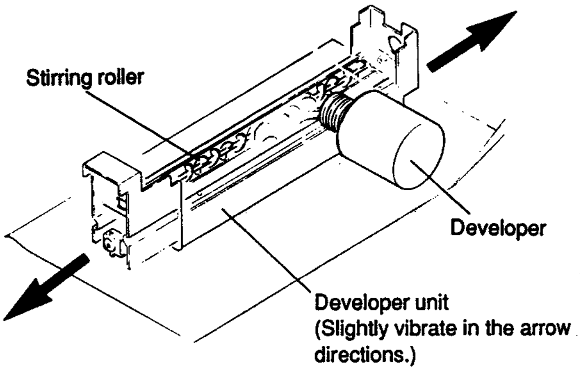
⑤ Rotate the developer drive gear and the transport/stirring drive gear, tilt the developer unit and vibrate it to remove the developer within the developer unit.

**Loading developer**

① Manually open the developer shutter.

NOTE: The entire developer tank may not be filled with developer unless the developer shutter is open.

② Load the developer while lightly tapping the developer unit.


Stirring roller
Developer
Developer unit
(Slightly vibrate in the arrow directions.)

NOTE: Never rotate the developer roller when loading the developer in the developer tank or before installing it after developer has loaded. Otherwise, it may result in developer scatter.

③ Check to see if the developer roller is dusted with developer. If the developer unit is installed with the roller contaminated with developer dust, it may cause the developer to scatter. If there is, empty the developer from the developer tank and start developer loading all over again.

## (2) Shield unit F/R replacement, cleaning

### I. Tools required

- Plus screwdriver
- Lintfree cloth
- Vacuum cleaner

### II. Problem caused by improper procedure

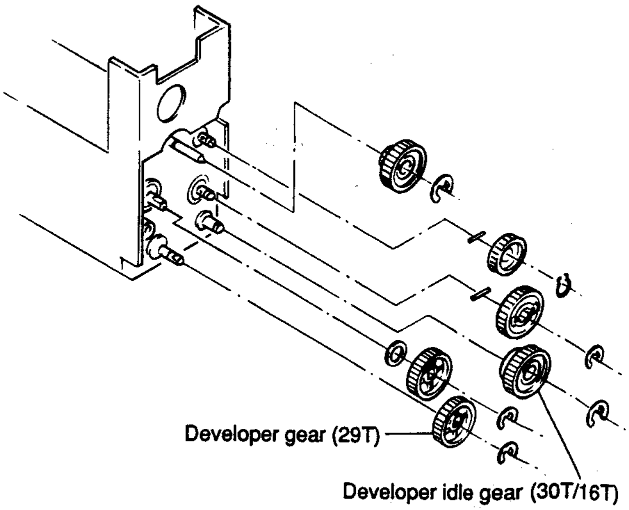
Toner scatter
↓
Stain on copy

PC belt damage
↓
Stripes on copy

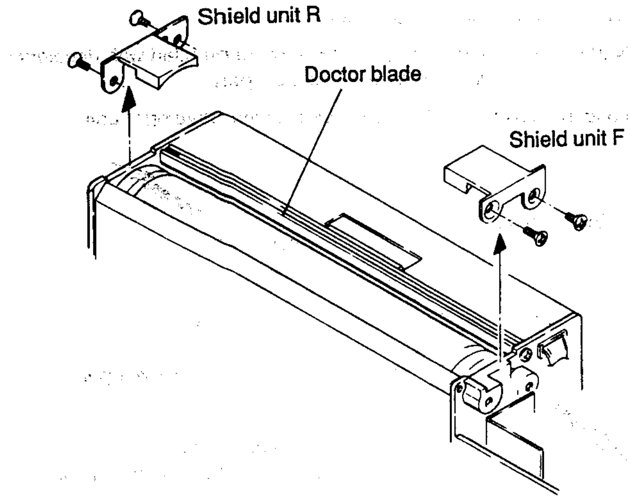
### III. Replacement and cleaning procedures

Shield unit F/R removal • Must be replaced every 120,000 copies

① Remove the developer drive gear (29T) and the idle gear (30/16T).


Developer gear (29T)
Developer idle gear (30T/16T)

② Remove the shield units F/R.


Shield unit R
Doctor blade
Shield unit F

Cleaning procedure • Must be cleaned at every preventive maintenance call.

Use a vacuum cleaner to clean.

## (3) Shield felt FRa/ FRb replacement and cleaning

### I. Tools required

- Cutter
- Lintfree cloth
- Vacuum cleaner

### II. Problem caused by improper procedure

Toner scatter
↓
Stain on copy

PC belt damager
↓
Stripes on copy

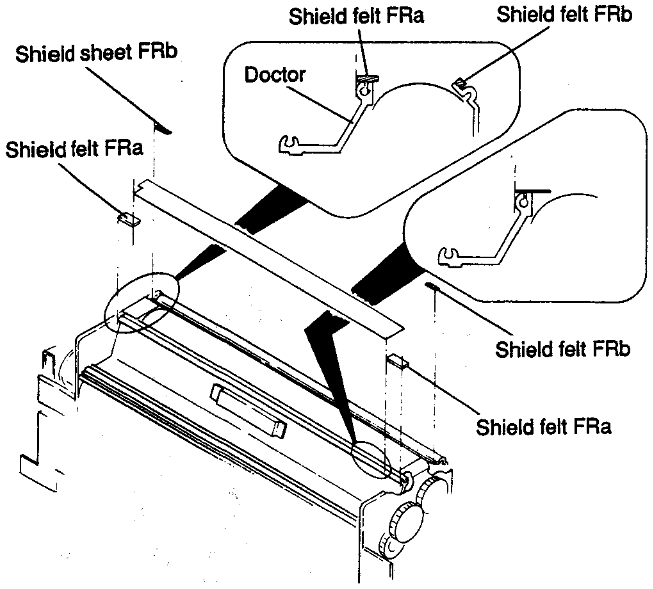
### III. Replacement and cleaning procedures

Shield felt FRa/FRb removal • Replace every 120K copies.

Peel away the shield felts FRa/FRb and clean away the area.

(Shield felt FRa/FRb bonding)

Attach the shield felts FRa/FRb on the area shown in the figure.


Shield felt FRa
Shield felt FRb
Shield sheet FRb
Doctor
Shield felt FRa
Shield felt FRb
Shield felt FRa

Cleaning procedure • Clean at every preventive maintenance call.

Use a vacuum cleaner to clean.

## (4) Shield felt A/B replacement and cleaning

### I. Tools required

- Cutter
- Lintfree cloth
- Vacuum cleaner

### II. Problem caused by improper procedure

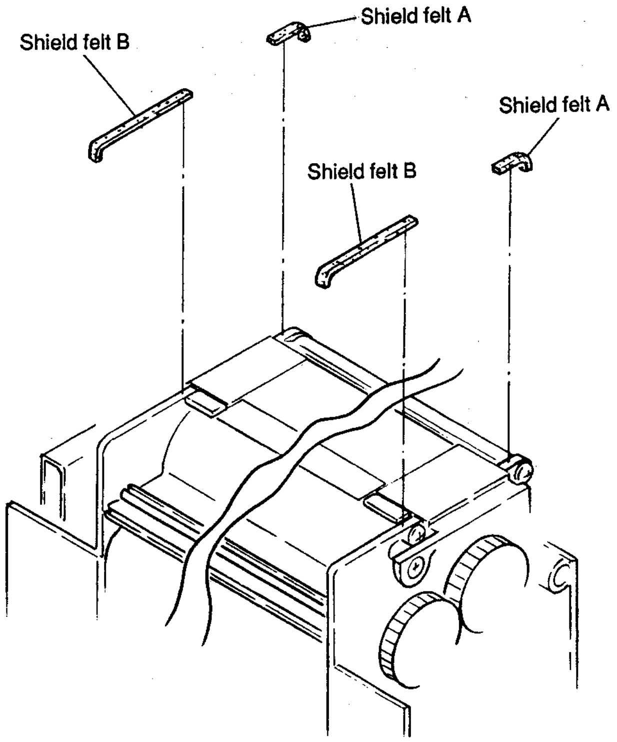
Toner scatter
↓
Stain on copy
PC belt damage

### III. Replacement and cleaning procedures

Shield felt A/B removal • Replace every 120K copies.

① Remove the toner concentration sensor cover.

② Peel away the shield felts A/B and clean away the area.
(Shield felt A/B bonding)
Attach the shield felts A/B on the area shown in the figure.


Shield felt A
Shield felt B
Shield felt A
Shield felt B

Cleaning procedure • Clean at every preventive maintenance call.

Use a vacuum cleaner to clean.

## (5) Shield sheet B replacement and cleaning for the yellow developer unit only

### I. Tools required

- Cutter
- Lintfree cloth
- Vacuum cleaner

### II. Problem caused by improper procedure

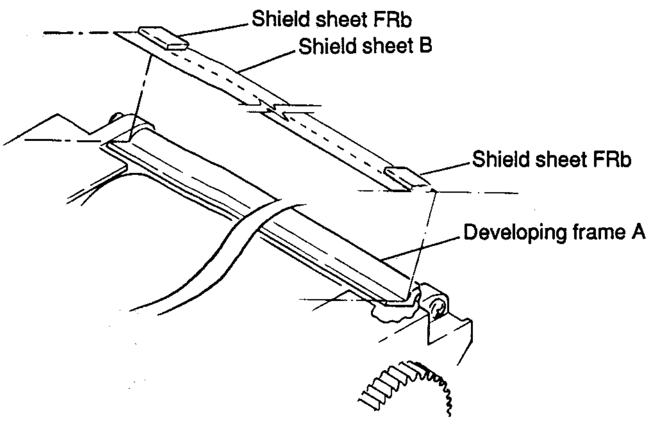
Toner scatter
↓
Stain on copy

### III. Replacement and cleaning procedures

Shield felt B removal • Replace every 120K copies.

Peel away the shield sheet B and clean away the area.

(Shield sheet B bonding)
Attach the shield sheet B on the area shown in the figure.


Shield sheet FRb
Shield sheet B
Shield sheet FRb
Developing frame A

Cleaning procedure • Clean at every preventive maintenance call.
Use a vacuum cleaner to clean.

## (6) Stirring roller replacement

### I. Tools required

- Plus screwdriver
- Hex wrench
- Pliers
- C-ring pliers

### II. Problems caused by improper procedure

- Stirring fault
  ↓
  Uneven copy density
  Color balance distortion
- Toner, developer leak
  ↓
  (Stain on copy)

### III. Replacement procedure

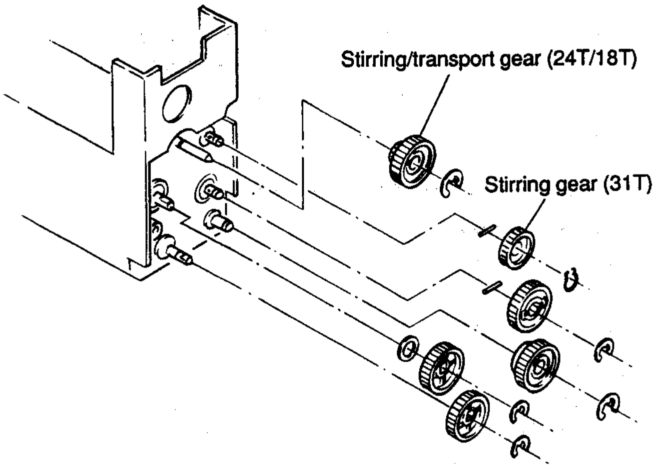
Stirring roller removal

① Remove the toner supply unit.

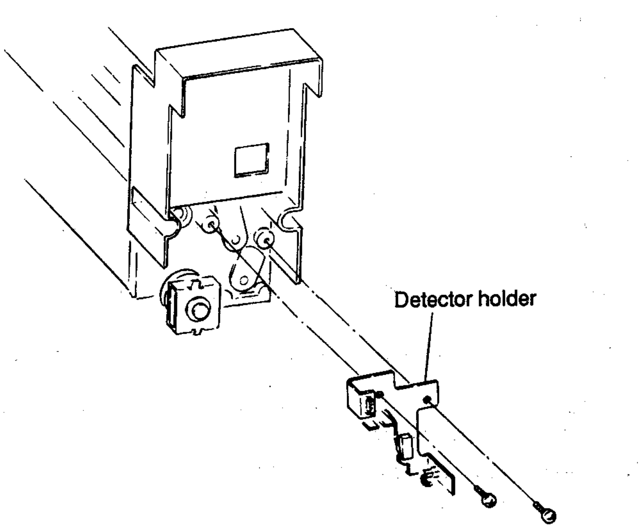
② Remove the developer cover.

③ Empty the developer from the developer unit.

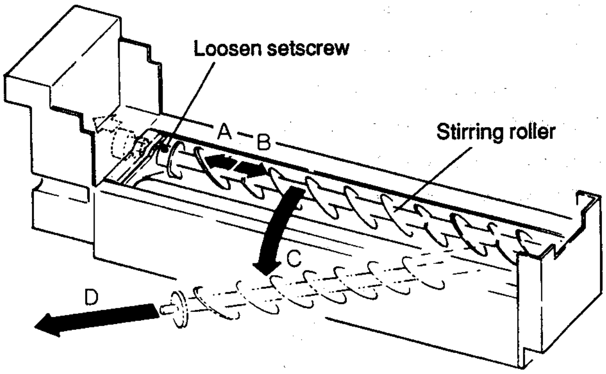
④ Remove the stirring and transport gears (29T/18T) and (31T).


Stirring/transport gear (24T/18T)
Stirring gear (31T)

⑤ Remove the detector holder.


Detector holder

⑥ Loosen the stirring roller setscrew.

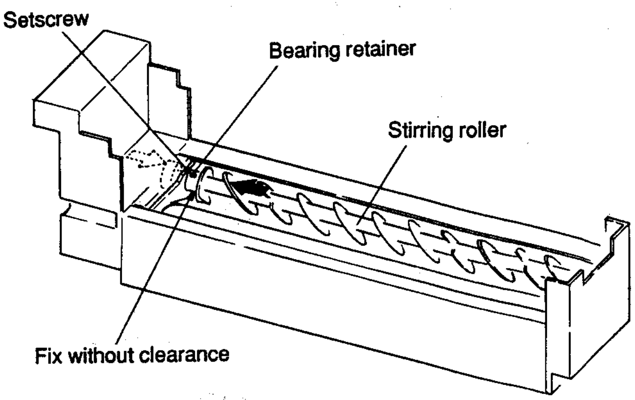

Loosen setscrew
Stirring roller
A
B
C
D

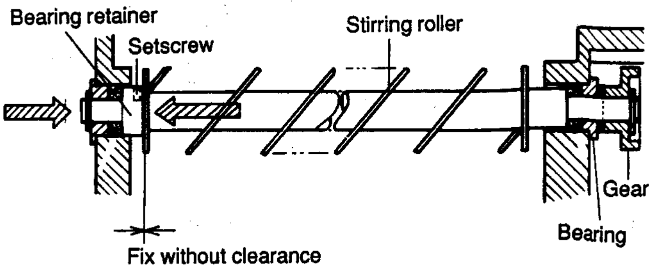
⑦ Move the stirring roller in order of arrowheads A~D.

Stirring roller replacement procedure

The shaft must be replaced with care not to allow a large play in the thrust direction.

(Move the stirring roller and the bearing retainer in the arrow direction and secure it with the setscrew so that there should be no gap between the front frame side stirring roller and the bearing retainer.)


Setscrew
Bearing retainer
Stirring roller
Fix without clearance


Bearing retainer
Setscrew
Stirring roller
Gear
Bearing
Fix without clearance

## (7) Developer roller replacement

### I. Tools required

- Plus screwdriver
- Pliers
- Minus screwdriver

### II. Note

- Do the following after the developer roller has been replaced.

① Adjust the gap between the doctor blade and the developer roller (Refer to page 11-13).

② Adjust the magnetic roller main pole position. (Refer to page 11-14)

- Note the difference between the developer roller and the transport roller.
  (While the surface of the developer roller is sand blasted, the transport roller has no such treatment.

### III. Problem caused by improper procedure

- Toner, developer leak

### IV. Replacement procedure

Developer roller removal

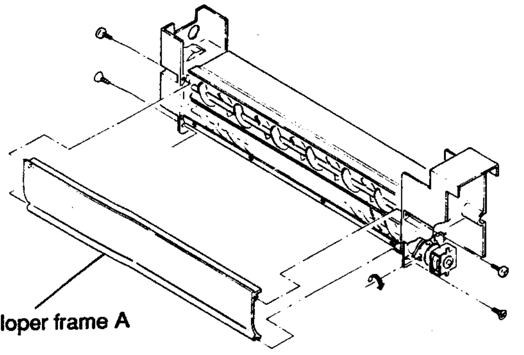
① Remove the toner supply unit.

② Remove the developer cover.

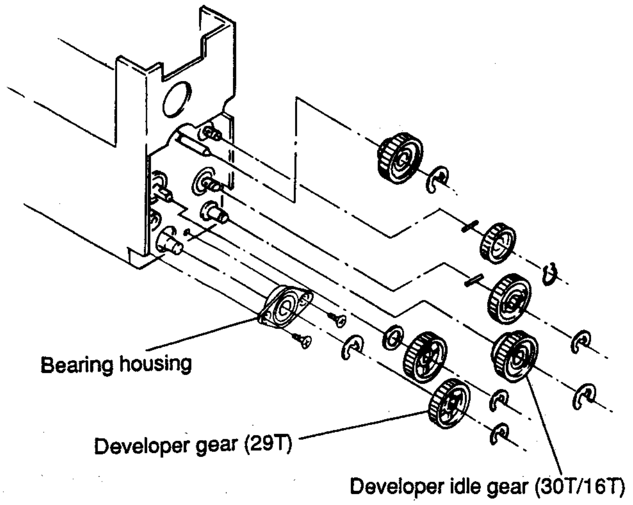
③ Empty the developer from the developer unit.

④ Remove the detector holder.

⑤ Remove developer frame A.

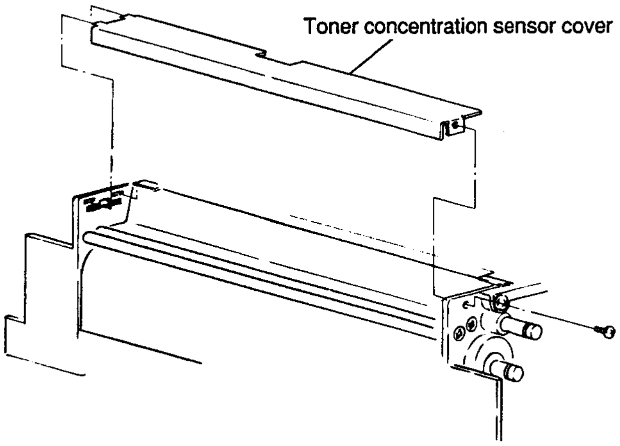

Developer frame A

⑥ Remove the developer drive gear (29T), developer idle gear (30T/16T), and the bearing housing.

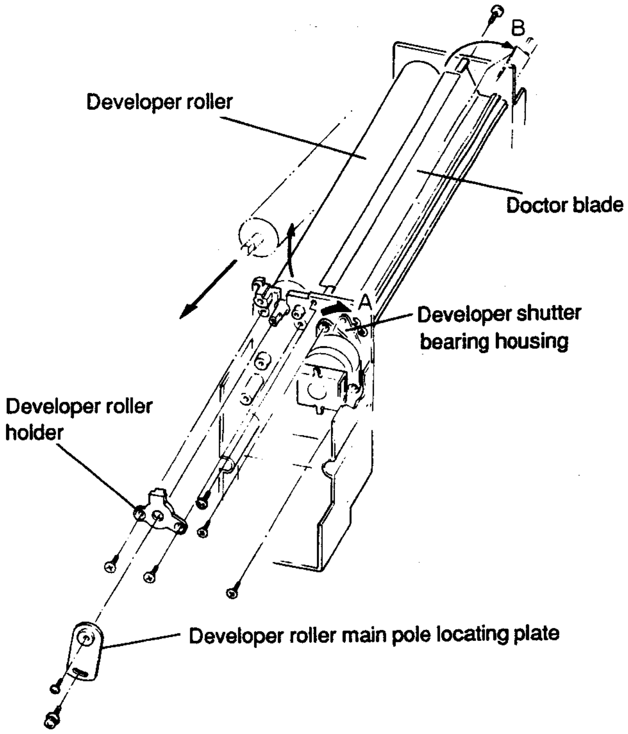

Bearing housing
Developer gear (29T)
Developer idle gear (30T/16T)

⑦ Remove the shield unit F/R.

⑧ Remove the toner concentration sensor cover.


Toner concentration sensor cover

⑨ Remove the two doctor blade holding screws, then move the doctor blade in the arrow direction B.


B
Developer roller
Doctor blade
A
Developer shutter bearing housing
Developer roller holder
Developer roller main pole locating plate

⑩ Remove the front frame side shutter bearing housing holding screw, then move the housing in the arrow direction A.

⑪ Remove the developer roller main pole positioning plate.

⑫ Remove the developer roller holder and the developer roller.

## (8) Transport roller replacement

### I. Tools required

- Plus screwdriver
- Pliers
- Minus screwdriver

### II. Note

- Do the following after the transport roller has replaced.
  (Magnetic roller main pole position adjustment)
- Note the difference between the developer roller and the transport roller.
  (While the surface of the developer roller is sand blasted, the transport roller has no such treatment.

### III. Problem caused by improper procedre

- Toner, developer leak

## IV. Replacement procedure

**Transport roller removal**

① Remove the toner supply unit.

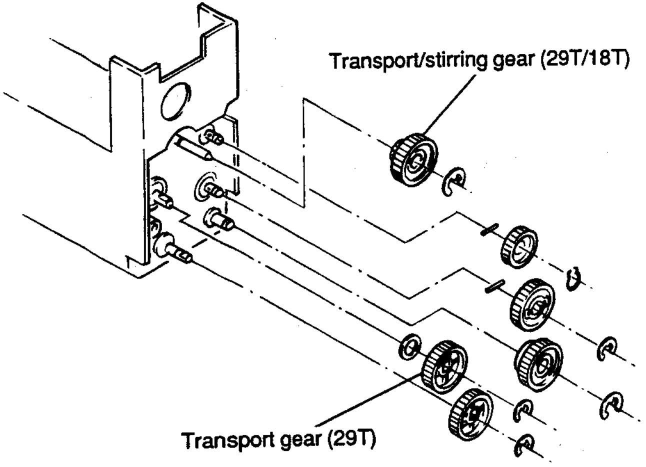
② Remove the developer cover.

③ Empty the developer from the developer unit.

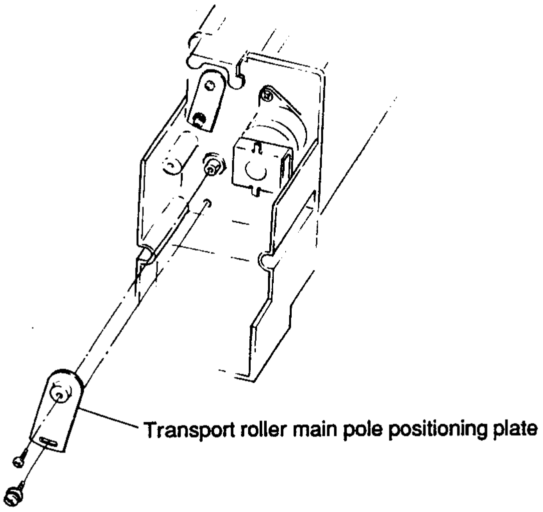
④ Remove the detector holder.

⑤ Remove developer frame A.

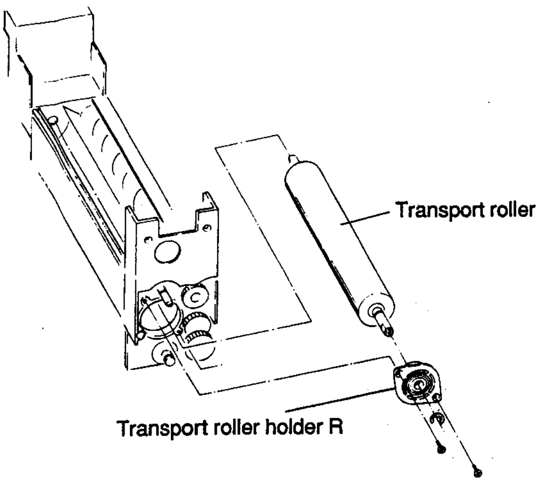
⑥ Remove the transport drive gear (29T) and the transport/stirring (29T/18T).


Transport/stirring gear (29T/18T)
Transport gear (29T)

⑦ Remove the transport roller main pole position plate.


Transport roller main pole positioning plate

⑧ Remove transport roller holder R, then the transport roller.


Transport roller
Transport roller holder R

## (9) Developer shutter replacement

### I. Tools required

- Plus screwdriver
- Pliers
- C-ring pliers

### II. Note

- Do not disassemble the shutter unit must be replaced as a whole unit and cannot be ordered by individual component.

### III. Problem caused by improper procedure

Incomplete shutter open and close

↓ Toner scatter / Stain on copy

↓ Toner/developer color mixing

↓ Abnormal copy color

### VI. Replacement procedure

**Developer shutter removal**

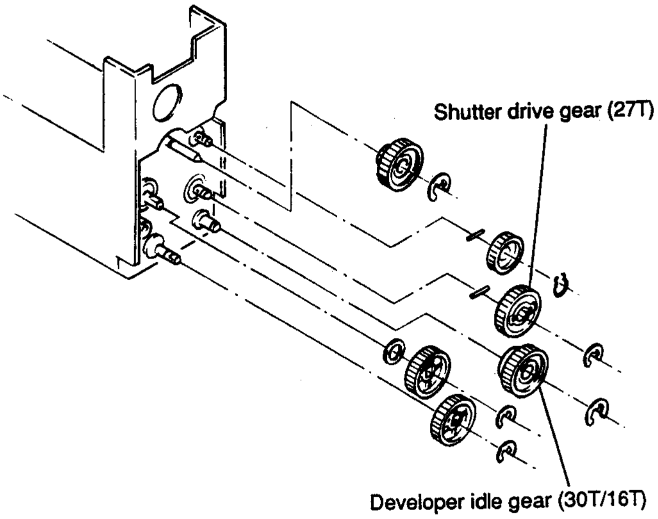
① Remove the toner supply unit.

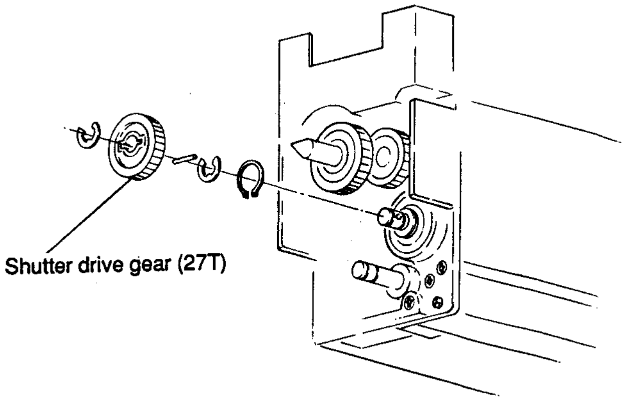
② Remove the developer cover.

③ Empty the developer from the developer unit.

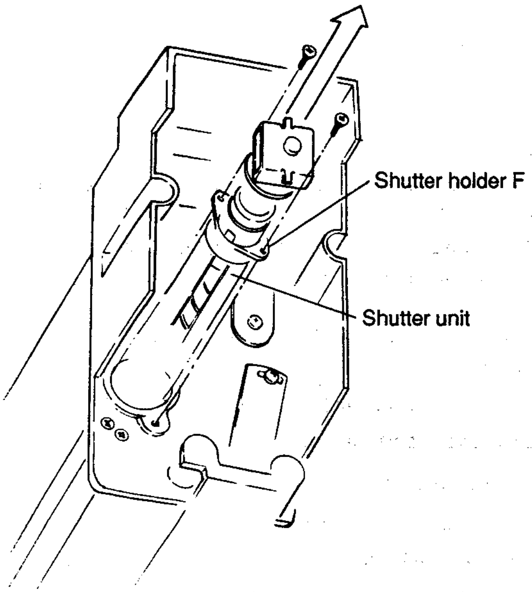
④ Remove the detector holder.

⑤ Remove the developer idle gear (30T/60T) and the shutter drive gear (27T).


Shutter drive gear (27T)
Developer idle gear (30T/16T)


Shutter drive gear (27T)

⑥ Remove shutter holder F.


Shutter holder F
Shutter unit

⑦ Remove the developer shutter unit from the front frame side.

## (10) Shield sheet A replacement, cleaning

### I. Tools required

- Cutter
- Lintfree cloth
- Vacuum cleaner

### II. Problem caused by improper procedure

Toner scatter
↓
Stain on copy
Damage in the PC belt

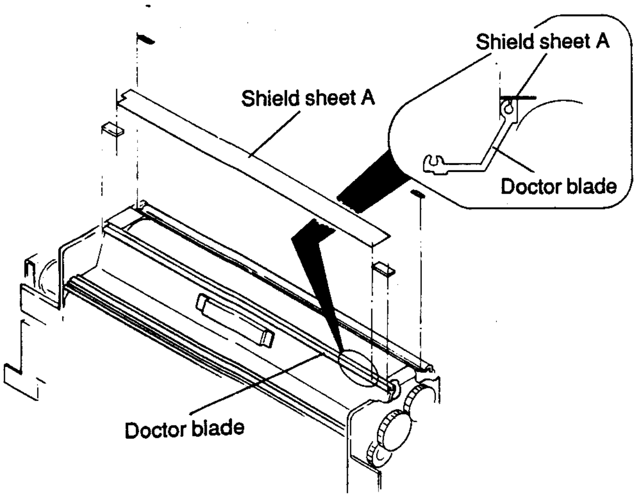
### III. Replacement and cleaning procedures

Shield sheet A removal • Remove/replace as necessary.

① Remove the toner concentration sensor cover.

② Peel away shield sheet A and clean away the area.

(Shield sheet A bonding)
Attach shield sheet A on the area shown in the figure.


Shield sheet A
Shield sheet A
Doctor blade
Doctor blade

## (11) Toner concentration sensor replacement

### I. Tools required

- Plus screwdriver

### II. Note

- Do the following when the toner concentration sensor has to be replaced.

① Replace the developer.

(In the case of color developer, all color developers of yellow, magenta, and cyan must be replaced together.)

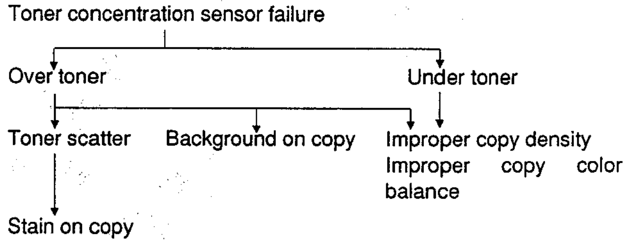
② Adjust the toner concentration sensor level, in reference to Page 3-12.

③ Set the gamma reference level, in reference to Page 3-16.

④ Perform gamma correction, in reference to Page 4-2.

⑤ Adjust the copy quality, in reference to Page 4-1.

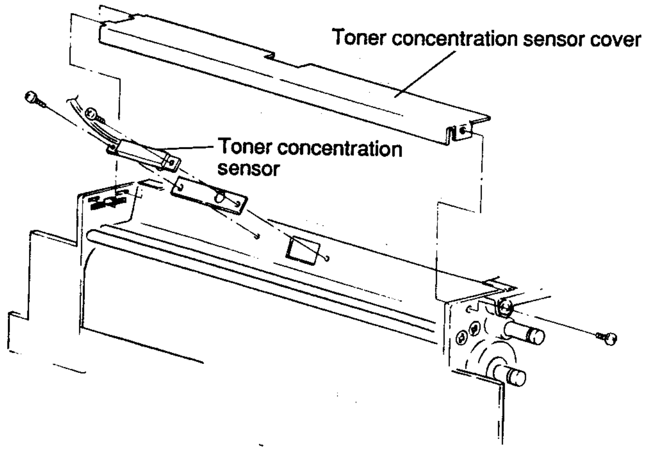
### III. Problems caused by improper procedure


Toner concentration sensor failure
Over toner
Under toner
Toner scatter
Background on copy
Improper copy density
Improper copy color balance
Stain on copy

### IV Replacement procedure

Toner concentration sensor removal

① Remove the toner concentration sensor cover.


Toner concentration sensor cover
Toner concentration sensor

② Remove the toner concentration sensor.

## (12) Toner supply motor replacement

### I. Tools required

- Minus screwdriver
- Plus screwdriver
- C-ring pliers
- Hex wrench

### II. Problems caused by improper procedure

- Toner supply failure
- Gear lock

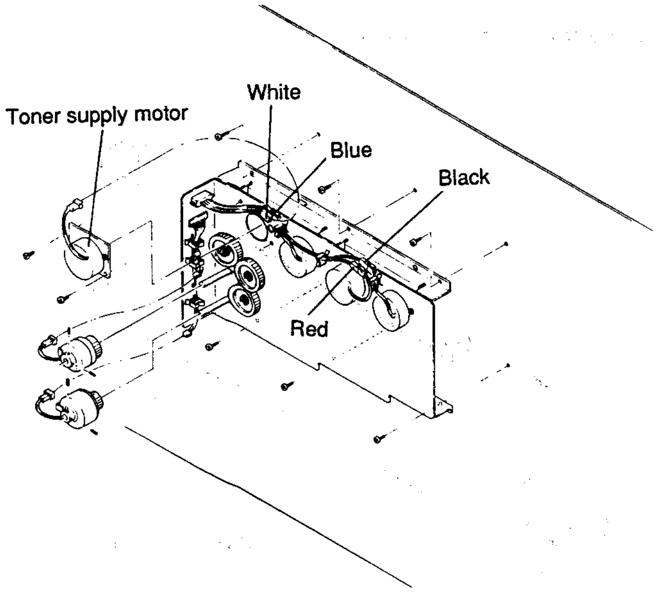
### III. Replacement procedure

Toner supply motor removal

① Remove the rear top panel.

② Remove the PWB holder with the PWB attached to it.

③ Remove the toner supply motor



NOTE: Note correct connection of the toner supply motor connector.

## (13) Stirring clutch replacement

### I. Tools required

- Plus screwdriver
- Minus screwdriver
- Allen wrench
- C-ring pliers

### II. Problems caused by improper procedure

- Stirring failure
- Gear lock

### III. Note

- The clutch gap must be adjusted whenever the stirring clutch is disassembled. (Refer to page 11-16)

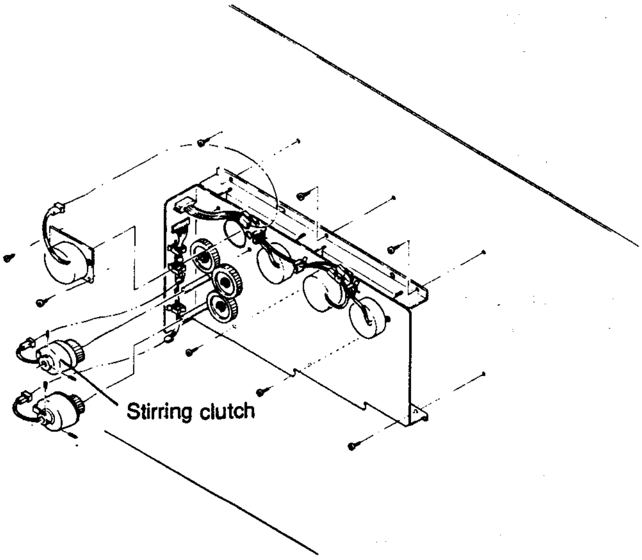
### IV. Replacement procedure

Stirring clutch removal

① Remove the rear top panel.

② Remove the PWB holder with the PWB attached to it.

③ Remove the stirring clutch.



## (14) Developer clutch replacement

### I. Tools required

- Plus screwdriver
- Minus screwdriver
- Hex wrench

### II. Problems caused by improper procedure

- Developing failure
- Gear lock

### III. Note

- The clutch gap must be adjusted whenever the developer clutch is disassembled. (Refer to page 11-16)

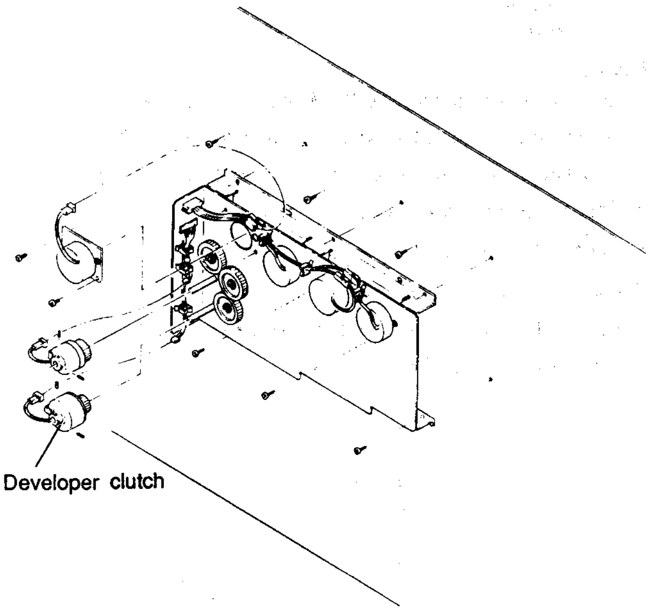
### IV. Replacement procedure

Developer clutch removal

① Remove the rear top panel.

② Remove the PWB holder with the PWB attached to it.

③ Remove the developer clutch.



## (15) Developer motor replacement

### I. Tools required

- Plus screwdriver
- C-ring pliers

### II. Problems caused by improper procedure

- Lock
- Developing failure

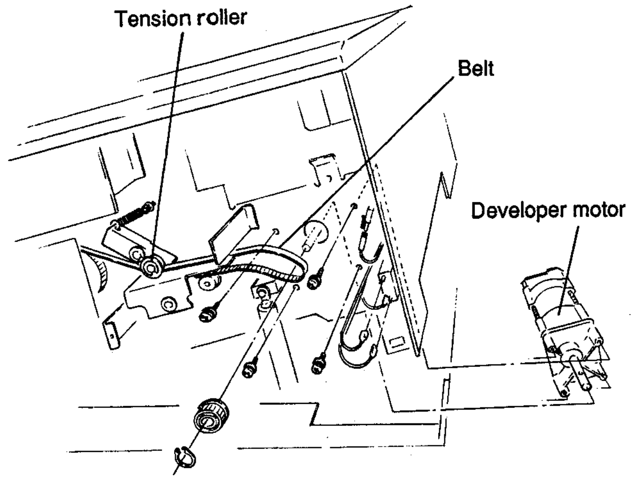
### IV. Replacement procedure

Developer motor removal

① Remove the rear top panel.

② Open the clamshell.

③ Release the drive belt tension.



④ Remove the developer motor.

## (16) DVBG/MHVG replacement

### I. Tools required

- Plus screwdriver

### II. Note

- Do the following after the DVBG/MHVG was replaced.

① Adjust the developing bias voltage. (Refer to page 11-17)

② Adjust the main corona grid voltage. (Refer to page 9-15)

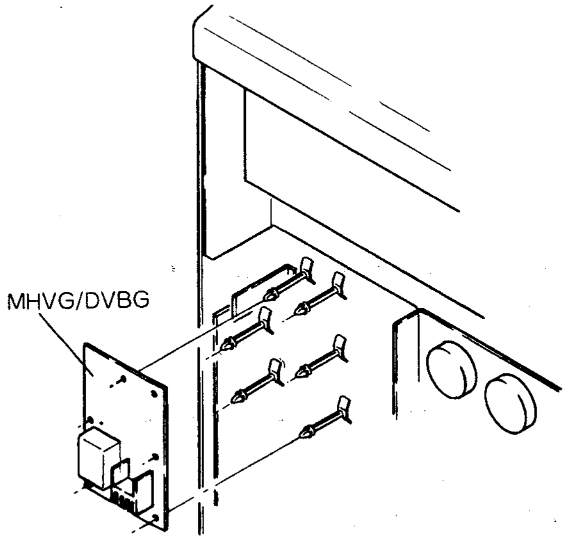
### III. Replacement procedure

DVGB/MHVG removal

① Remove the rear top exterior.

② Remove the PWB holder with the PWB attached to it.

③ Remove the DVBG/MHVG.



## (17) Toner supply roller replacement

### I. Tools required

- Plus screwdriver
- Minus screwdriver
- Pliers

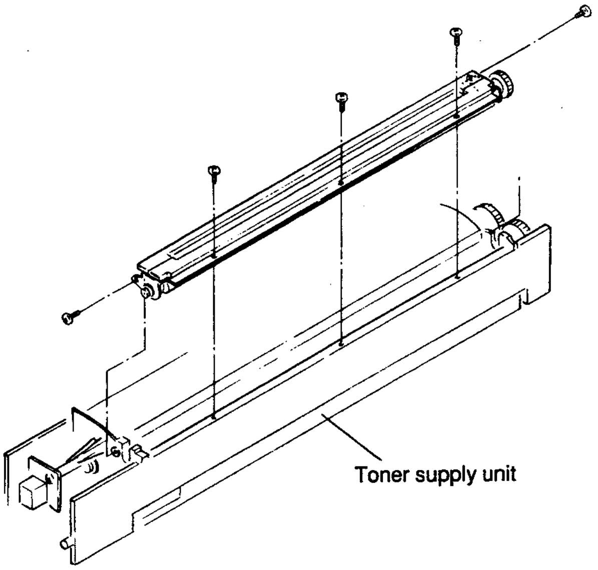
### II. Problems caused by improper procedure

- Toner supply failure
- Toner clogging

### III. Replacement procedure

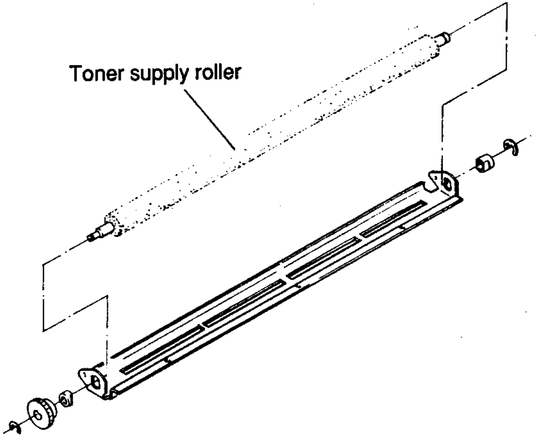
Toner supply roller removal

① Remove the toner supply unit.



② Empty the toner from the toner supply unit.

③ Remove the toner supply roller.



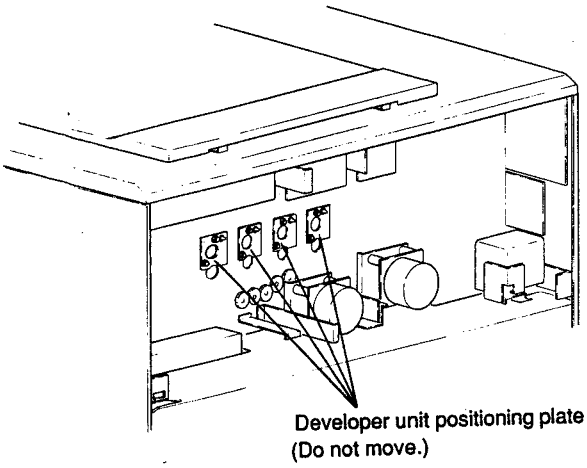
### IV. Note

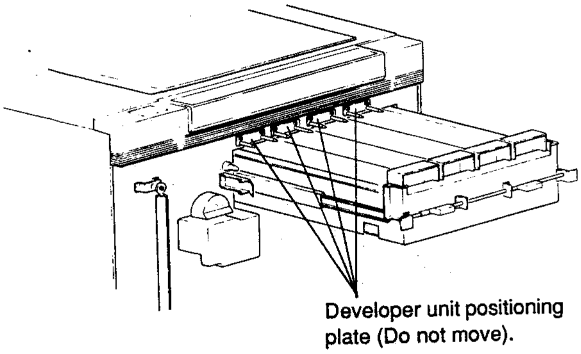
Do not change the location of the developer unit positioning plate which is on the front frame and rear frame sides.

They are used to keep the proper distance between the developer roller and the PC belt, one of the following troubles may occur if the location was changed.

- Uneven developing
  ↓
  Uneven copy density
  ↓
  Color balance distortion
- Insufficient developing
  ↓
  Insufficient of copy density
  ↓
  Color balance distortion
- Toner scatter
  ↓
  Stain on copy
- Damage to the PC belt.
  ↓
  Stripes on copy

(Note) Note that the position of the developer unit positioning plate cannot be adjusted in the field.


Developer unit positioning plate
(Do not move.)


Developer unit positioning
plate (Do not move).

# 7. Adjustments

## A. List

| Item No. | Description | Ref. page |
|---|---|---|
| (1) | Doctor blade gap adjustment | 11-13 |
| (2) | Developer roller main pole adjustment | 11-14 |
| (3) | Transport roller main pole adjustment | 11-15 |
| (4) | Developer clutch gap adjustment | 11-16 |
| (5) | Stirring clutch gap adjustment | 11-16 |
| (6) | Developing bias voltage adjustment | 11-17 |

## B Adjustments

### (1) Doctor blade gap adjustment

#### I. General

The gap between the doctor blade and the developer roller is adjusted by changing the location of the doctor blade.

#### II. Purpose

Used to obtain the optimum copy density by controlling the developer supply to the developer roller.

#### III. When adjustment is required

- When the developer roller is removed or replaced.
- When the doctor blade is removed or replaced.

#### IV. Tools required

- Plus screwdriver
- Thickness gauge (2.0mm/1.5mm) (UKOGM0042CSZZ)
- Pliers
- Minus screwdriver

#### V. Note

- Do not scratch the surface of the developer roller.
- Note the difference among doctor blade gaps of the black, yellow, magenta, and cyan developer units before making adjustment.

#### VI. Problems caused by improper adjustment

[Too wide of a gap]

- Toner scatter
  ↓
  Stain on copy

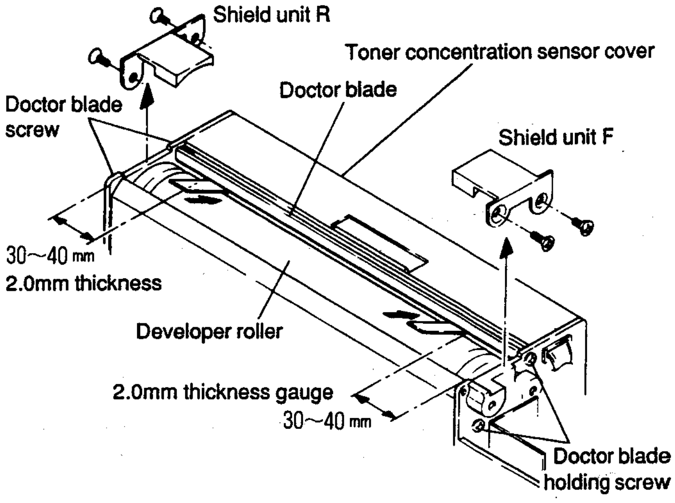
[Too narrow of a gap]

- Drop in developing efficiency
  ↓
  Copy density drop
  ↓
  Color balance distortion
  Drop in developer life

#### VII. Adjustment procedure

① Remove the developer and the toner on the developer roller. (Close the developer shutter and rotate the developer roller, then the transport roller.)

② Remove the shield units F/R.


Shield unit R
Toner concentration sensor cover
Doctor blade
Doctor blade screw
Shield unit F
30~40 mm
2.0mm thickness
Developer roller
2.0mm thickness gauge
30~40 mm
Doctor blade holding screw

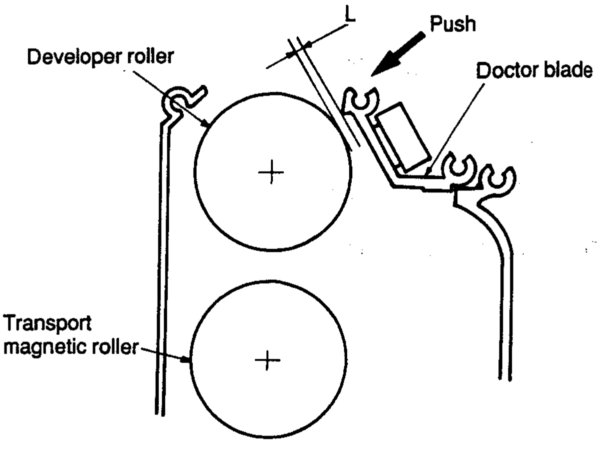
③ Remove the toner concentration sensor cover.

④ Loosen the four doctor blade holding screws.

⑤ Insert the thickness gauge 30 to 40mm from the edge of the developer unit front and rear ends.

| Kind of developing unit | Doctor blade gap limits (L) | Thickness gauge used |
|---|---|---|
| Y.M.C | 1.5±0.05mm | 1.5mm |
| BK | 2.0±0.05mm | 2.0mm |

⑥ Press the doctor blade in the arrow direction and secure it.


L
Push
Developer roller
Doctor blade
Transport magnetic roller

⑦ Check that the doctor blade gap is within the limits at the center and ends. If not, repeat steps ④ to ⑦.

## (2) Developer roller main pole adjustment

### I. General

Used to set the developer roller main pole to the optimum position by adjusting the main pole positioning plate.

### II. Purpose

Used to achieve maximum developing efficiency.

### III. When the adjustment is required

- When the developer roller is removed or replaced.
- When the developer roller main pole locating plate is removed or replaced.

### IV. Tools required

- Plus screwdriver
- Scale
- String
- Paper clip or pin

### V. Problems caused by improper adjustment

Toner scatter
↓
Stain on copy

Drop in developing efficiency
↓
Copy density drop
↓
Color balance distortion

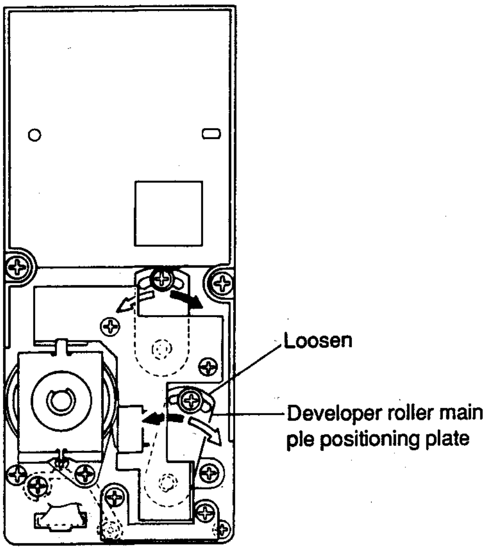
### VI. Adjustment method

① Remove the developer and toner on the developer roller. (Close the developer shutter and rotate the developer roller, then the transport roller.)

② Place the developer unit flat on a flat level surface.

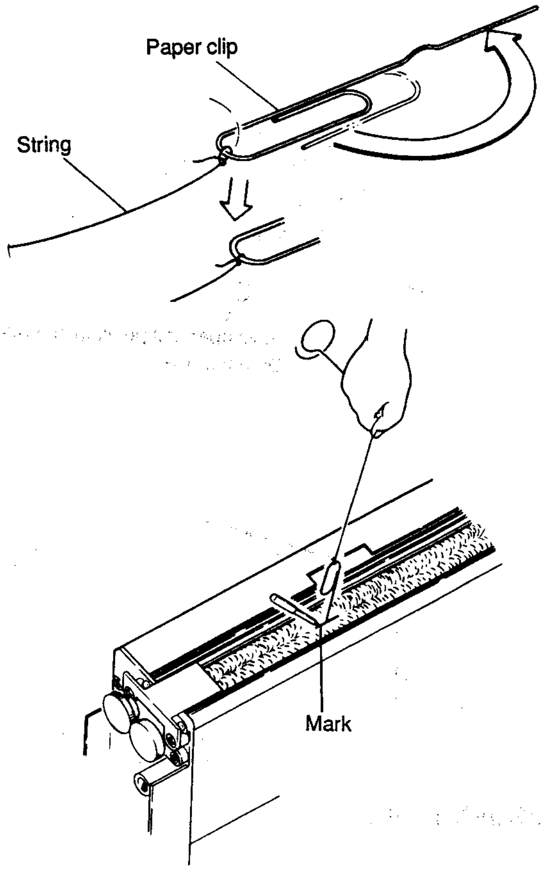
NOTES:
- Do not allow dust between the developer unit and the table.
- Do not place the developer unit over a metallic table.

③ Loosen the developer roller main pole positioning plate holding screw.

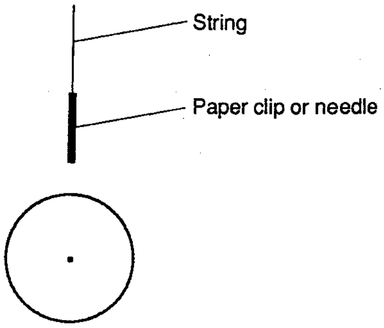

Loosen
Developer roller main ple positioning plate

④ Put the developer unit upside down.

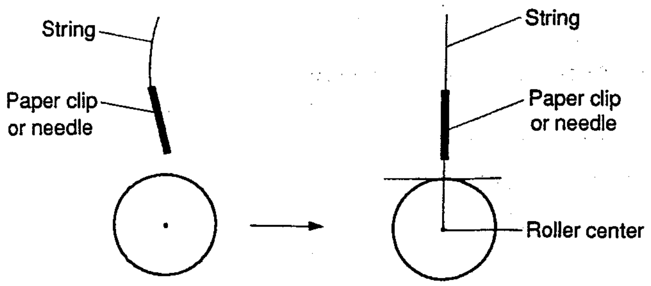
⑤ Attach the clip to the end of the string and move it close to the developer roller.


Paper clip
String
Mark

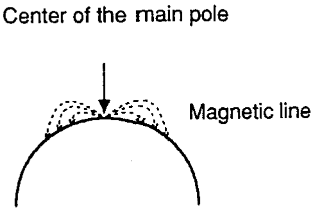
⑥ Slowly move down the paper clip or needle close to the main pole.


String
Paper clip or needle

⑦ At the point where the paper clip or needle starts being attracted by the magnet, adjust the string so that the string, the paper clip or needle, and the roller center are aligned on a line. (Visual adjustment)

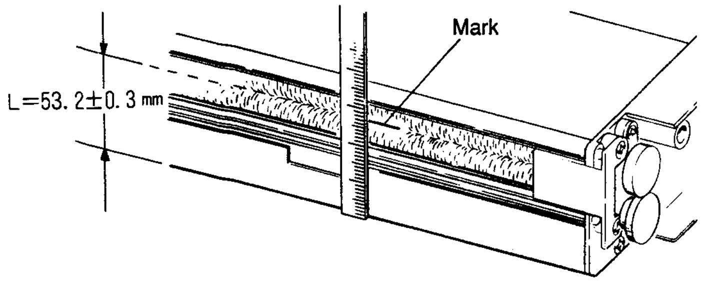

String
Paper clip or needle
String
Paper clip or needle
Roller center

⑧ Make the tip of the paper clip or needle contact with the roller surface.



⑨ Mark the point where the clip is attracted to the developer roller. Place the unit on its as shown.

⑩ Measure the distance (L) from the table top to the mark.



If the distance (L) is 53.2±0.3mm, secure the developer roller main pole positioning plate. Adjustment is complete.
If not, perform steps ⑦ to ⑨.

⑪ Erase the mark in procedure ⑤.

⑫ Change the location of the developer roller main pole positioning plate (arrowhead).

⑬ Do steps ④ to ⑥.
Repeat steps ④ to ⑧ until ⑥ is satisfied.

## (3) Transport roller main pole adjustment

### I. General

Used to set the transport roller main pole to the optimum location by adjusting the main pole locating plate.

### II. Purpose

Used to achieve maximum developer and toner supply efficiency.

### III. When the adjustment is required

- When the transport roller is removed or replaced.
- When the transport roller main pole locating plate is removed or replaced.

### IV. Tools required

- Plus screwdriver
- Scale
- String
- Paper clip or pin

### V. Problems caused by improper adjustment

Developer, toner transport failure
Developer, toner collect failure
↓
Developer, toner scatter
↓
Stain on copy

### VI. Adjustment method

① Remove the toner supply unit.

② Remove the developer cover.

③ Empty the developer from the developer unit.

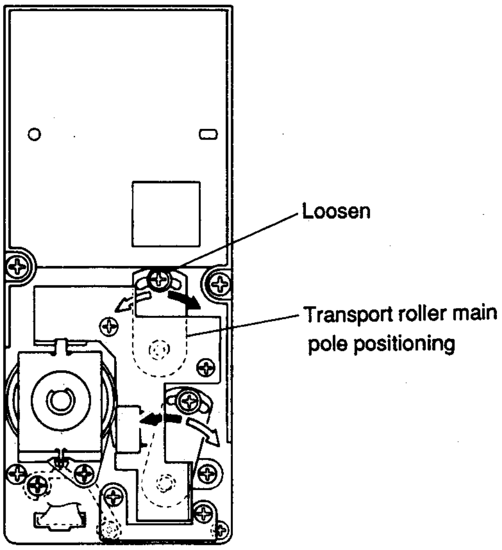
④ Remove developing frame A.

⑤ Remove any excess developer from the transport roller.

⑥ Place the developer unit upright on a flat level surface.

NOTES:
- Do not allow dust between the developer unit and the table.
- Do not place the developer unit on a metallic table.

⑦ Loosen the transport roller main pole positioning plate holding screw.

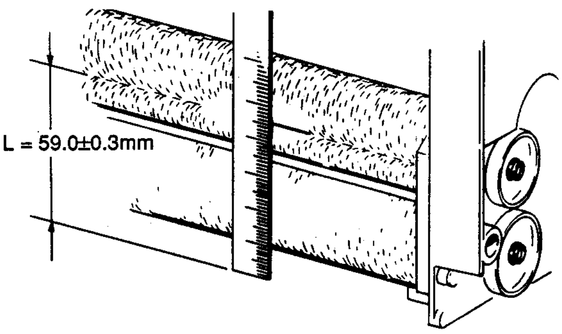


⑧ Put the developer unit aside.

⑨ Mark the point where the clip is attracted to the developer roller.

⑩ Put the developer unit straight without moving the main pole positioning plate and the developer roller as shown.

⑪ Measure the distance (L) from the table top to the mark.
If the distance (L) is 59.0±0.3mm, secure the transport roller main pole positioning plate. The adjustment is complete.
If not, continue on to steps ⑩ to ⑫.



⑫ Erase the mark in procedure ⑨.

⑬ Change the location of the transport roller main pole positioning plate (arrowhead).

⑭ Do steps ⑨ to ⑪
Repeat steps ⑨ to ⑬ until ⑪ is satisfied.

## (4) Developer clutch gap adjustment

### I. General

Used to set the clutch thrust direction gap to the optimum.

### II. Purpose

Used to properly achieve the following actions.

- On and off of the developer roller, transport spiral shaft, developer shutter drive.
- Conveyance of the power from the developer motor to the developer roller, transport spiral shaft, and developer shutter.

### III. When the adjustment is required

- When the developer clutch is removed or replaced.

### IV. Tools required

- Hex wrench
- Thickness gauge (0.2mm) UKOG-0147FCZZ
- Plus screwdriver

### V. Note

- Do not insert the thickness gauge into the rotor contact area to adjust to prevent possible scratching of the rotor which may result in a malfunction.

### VI. Problems caused by improper adjustment

[Too small the gap]

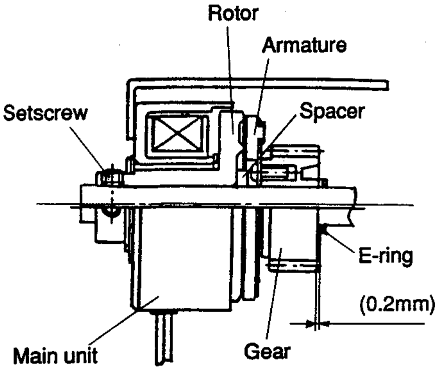
- The developer motor may fail to turn off driving.
  ↓
  The developer roller or transport spiral shaft may keep operating.

[Too large the gap]

- The developer motor power may not be conveyed to the developer roller, transport spiral shaft, and developer shutter. Even if conveyed, a lack of torque may be encountered.
  ↓
  Color balance distortion
  Uneven copy density
  Appearance of white spots

### VII. Adjustments

① Loosen the two clutch holding setscrews.



② Insert the thickness gauge (0.2mm) between the clutch shaft and the E-ring and push the clutch in the arrow direction.

③ Tighten the clutch screw.

## (5) Stirring clutch gap adjustment

### I. General

Used to obtain the optimum thrust direction clearance of the clutch.

### II. Purpose

Used to achieve proper action of the following.

- On and off of the transport roller and stirring spiral shaft.
- Conveyance of the drive power from the developer motor to the transport roller and the stirring roller.

### III. When the adjustment is required

- When the stirring clutch is removed or replaced.

### IV. Tool required

- Hex wrench
- Thickness gauge (0.2mm) UKOG-0147FCZZ
- Plus screwdriver

### V. Note

- Do not insert the thickness gauge into the rotor contact area to adjust to prevent possible scratching of the rotor which may result in a malfunction.

### VI. Problems caused by improper adjustment

[Too small of a gap]

- The developer motor may fail to turn off driving.
  ↓
  The transport roller or stirring roller may keep operating.
  (Drop in developer life)

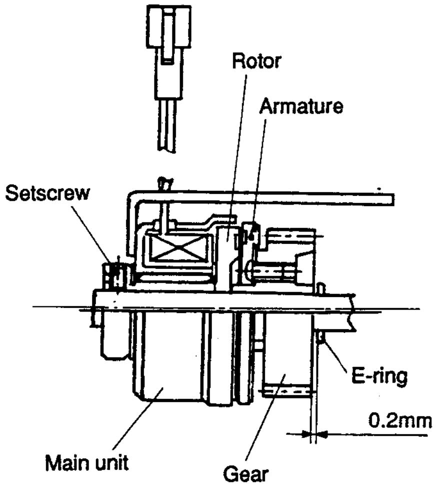
[Too large of a gap]

- The developer motor power may not be conveyed to the transport roller and the stirring roller. Even if conveyed, a lack of torque may be encountered.
- Poor stirring on account of transport roller and stirring roller rotation failure, toner collect failure, or toner or developer scatter.
  ↓
  Developer and toner collect failure due to improper shutter action and developer roller rotation.
  ↓
  Color balance distortion
  Low copy density
  Appearance of background

### II. Adjustment

① Loosen the two clutch holding setscrews.

② Insert the 0.2mm thickness gauge between the clutch shaft E-ring and the clutch and push the clutch in the arrow direction.



③ Tighten the two clutch holding setscrews.

## (6) Developing bias voltage adjustment

### I. General

As there are three kinds of developing bias voltage, they must be adjusted in the following manner.

- Developing bias voltage in the graphics mode (DC-100V)
- Developing bias voltage in the photo mode (DC-80V)
- Developing bias voltage in the warmup mode (DC-60V)

Use test command 8 to adjust.

### II. Purpose

Used to prevent developer and toner scatter, as well as obtaining the optimum copy density.

### III. When the adjustment is required

- When the MHVG/DVBG PWB is replaced.
- When the main PWB is replaced
- When VR102, 103, or 104 of the main PWB is replaced.

### IV. Tools required

- Adjusting small minus screwdriver
- Digital multimeter

### V. Note

- Never touch the VR on the MHVG/DVGB.

### VI. Problems caused by improper adjustment

[When developing bias voltage is too low]

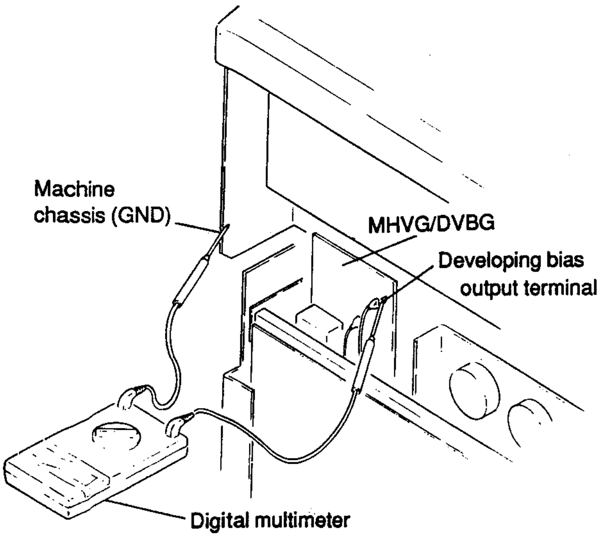
- Background on copy
- Developer, toner scatter
  ↓
  Stain on copy
- Improper copy color balance

[When developing bias voltage is too high]

- Improper copy color balance
- Insufficient copy density

### VII. Adjustment procedure

① Measure the voltage across the MHVG/DVGB PWB developing bias output terminal and the machine chassis (ground) using the digital multimeter.

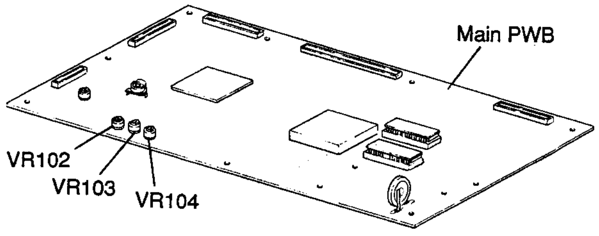


② Perform test command 8.
C → 0 → 0 → C → 8 → COLOR PSW
"1" will be displayed in the copy number window.

③ Depress the COLOR PSW.

- The developing bias voltage in the graphics copy mode is applied for a period of 30 seconds.
- While the bias voltage is being applied, the color copy ready lamp goes out.

④ Adjust the main PWB VR102 to obtain the developing bias voltage of DC-100±5V.



⑤ Enter "2" on the numeric keypad.

- "2" is displayed in the copy number window.

⑥ Depress the COLOR PSW.

- The developing bias voltage in the photo copy mode is applied for a period of 30 seconds.
- While the bias voltage is being applied, the color copy ready lamp goes out.

⑦ Adjust the main PWB VR103 to obtain the developing bias voltage of DC–80±5V.

⑧ Enter "3" on the numeric keypad.

- "3" is displayed in the copy number window.

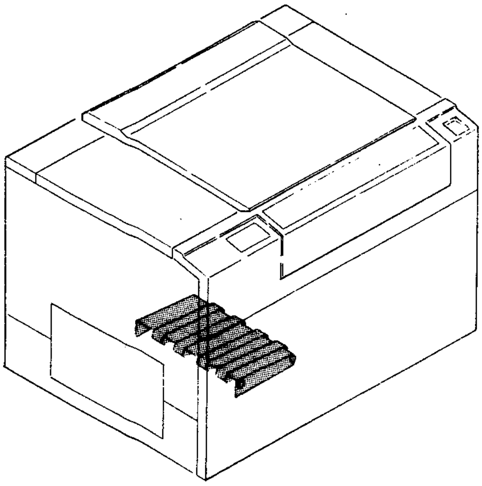
⑨ Depress the COLOR PSW.

- The developing bias voltage in the warmup mode is applied for a period of 30 seconds.
- While the bias voltage is being applied, the color copy ready lamp goes out.

⑩ Adjust the main PWB VR104 to obtain the developing bias voltage of DC –60±5V.

⑪ Depress the CLEAR key to cancel test command 8.
If you want to change to another mode while the developing bias voltage in the certain mode is on, type the mode number to be selected twice on the keypad. At the first key entry, the currently issued developing bias voltage is turned off and at the second depression of the key, the new mode is selected.

# [12] PAPER TRANSPORT MECHANISM

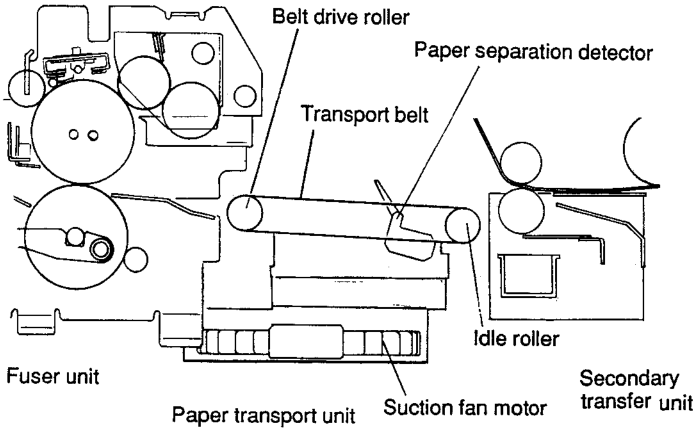


## 1. General

The paper transport mechanism consists of the transport belt, suction fan, and paper separation detector.

The speed of paper transport is controlled according to the operating mode.

## 2. Construction


Belt drive roller
Paper separation detector
Transport belt
Idle roller
Fuser unit
Secondary transfer unit
Paper transport unit
Suction fan motor

## 3. Major components and functions

### (1) Transport belt

Used to transport the paper from 2nd transfer unit to fuser unit. Holes are provided in the belt to draw paper downward by the action of the suction fan.

### (2) Paper separation detector

Used to sense separation of paper.

### (3) Belt drive roller

Used to convey the rotating power from the PF motor to the transport Belt.

### (4) Suction fan motor

An AC motor is used to draw paper to the transport belt.

### (5) Ozone filter

Used to absorb ozone within the machine.

## 4. Major parts disassembly, re-assembly, replacement, cleaning

### A. List

| Item No. | Parts name | When replacement required | When cleaning required | Ref. page |
|---|---|---|---|---|
| (1) | Transport belt | — | At every maintenance | 12-2 |
| (2) | Paper separation detector | — | At every maintenance | 12-2 |

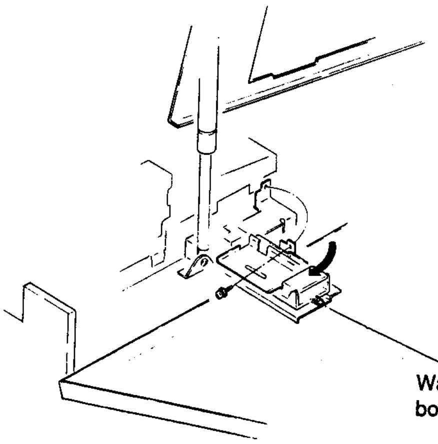
### B. Method

Paper transport unit removal

① Open the clamshell mechanism.

② Remove the waste toner collection bottle.

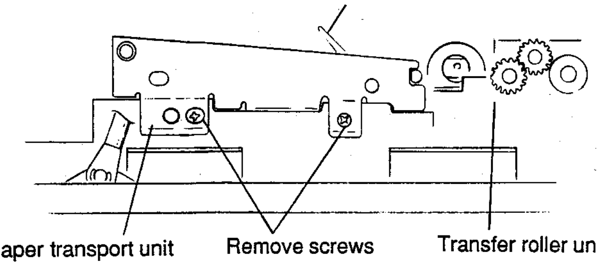
③ Slide out after removing screw the waste toner collection bottle bracket.


Waste toner collection bottle bracket

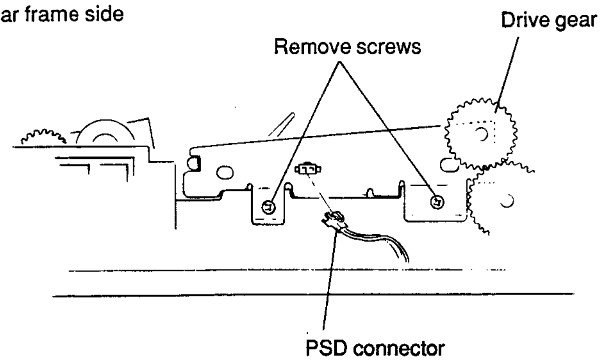
④ Remove the rear lower panel and then remove the PSD connector.

⑤ Remove the screws on front and rear frame sides and remove the paper transport unit.

(Front frame side)


PSD actuator
Paper transport unit
Remove screws
Transfer roller unit

Rear frame side


Drive gear
Remove screws
PSD connector

## (1) Transport belt replacement, cleaning

### I. Tools required

- Phillips tip screwdriver
- Alcohol
- Lintfree cloth

### II. Precautions

- Note the surface of the belt. The notched side is the surface.
- Always replace all four belts at the same time.

### III. Problem owing to inproper rodedure

- Paper feed failure
  ↓
  Paper misfeed

### IV Replacement and cleaning methods

(Belt replacement)

① Remove the belts from the front frame side without removing the roller.

(Belt cleaning)

① Clean the belt with a soft cloth dampened with alcohol.

(The rollers must be cleaned, as well.)

## (2) Paper separation detector replacement and cleaning

### I. Tools required

- Phillips tip screwdriver
- Wire cutter
- Wiring tie
- Lintfree cloth

### II. Problem owing to inadequate job

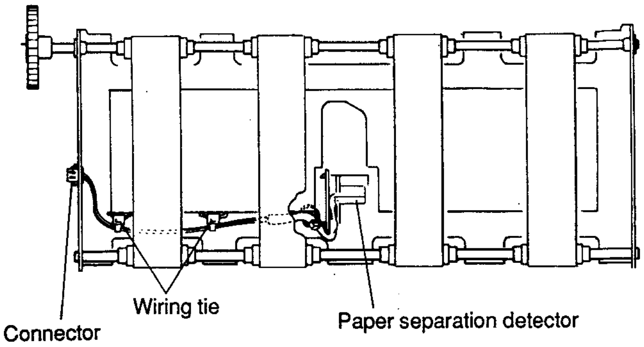
- Paper detect failure
  ↓
  Paper misfeed

### III. Replacement and cleaning methods

(Paper separation detector removal)

① Cut the wiring tie of the paper separation detector and remove it from the paper transport unit.

NOTE: Do not damage the wire.


Connector
Wiring tie
Paper separation detector

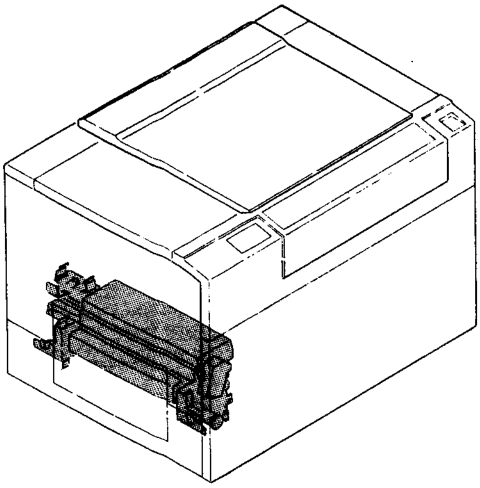
(Paper separation detector installation)

① Install it to the transport unit with care not to pinch the wire to the separation detector.

(Paper separation detector cleaning)

① Clean the detector with a soft cloth.

# [13] FUSER BLOCK



## 1. General

The fuser unit consists of upper and lower heat rollers, cleaning roller oil, oil applicator roller unit, upper and lower cleaning rollers, halogen heater lamps (x2) within the upper heat roller, fuser temperature controller, thermistor, thermostat, and thermal fuse.

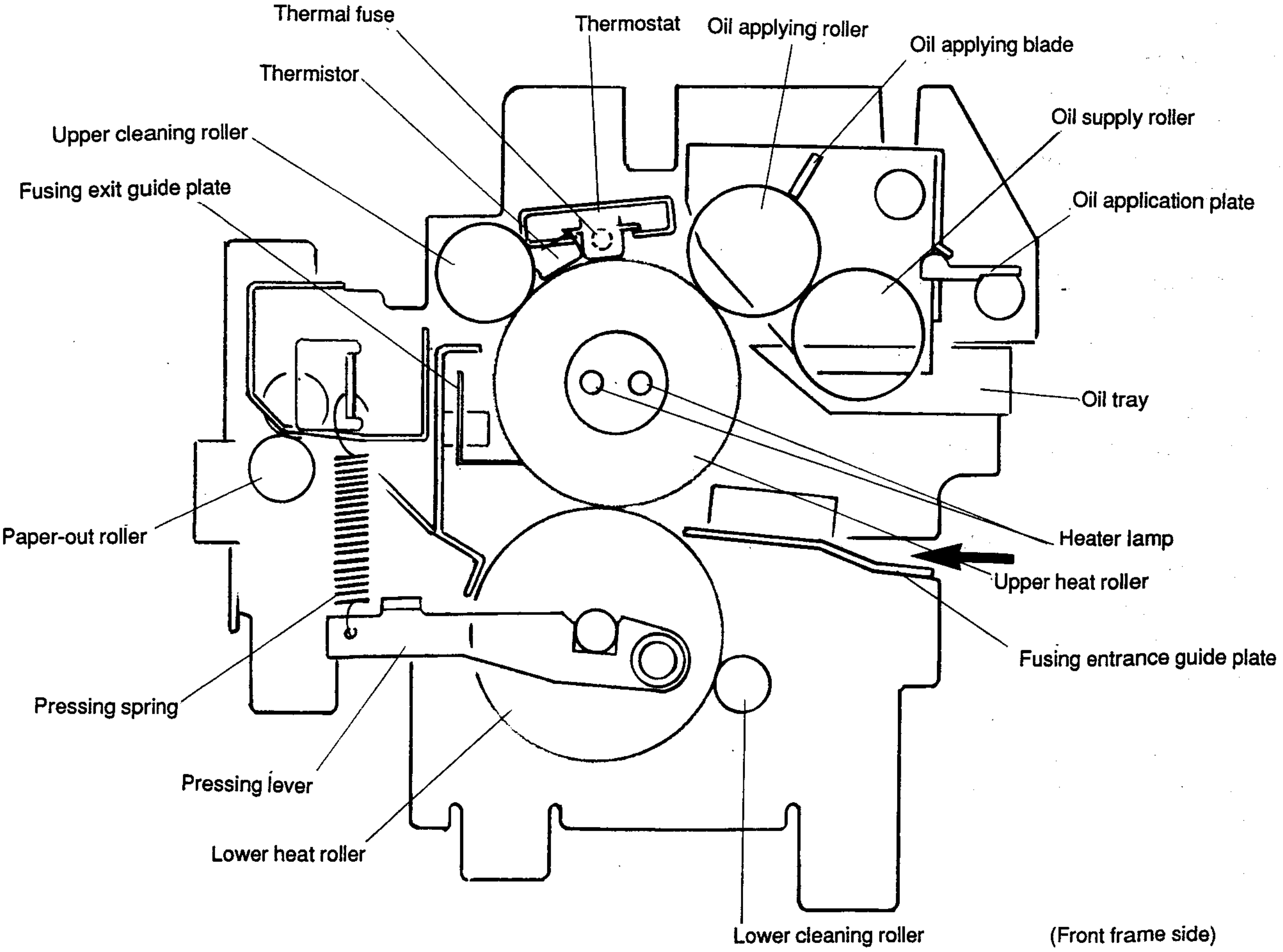
A toned image on the TX belt is transferred onto the copy paper and carried onto the fuser unit by the suction belt and passes between the upper and lower heat rollers. The toned image on the copy paper is fused by heat and pressure, and each color of yellow, magenta, and cyan is mixed to reproduce a colored image on the copy paper.

## 2. Specifications

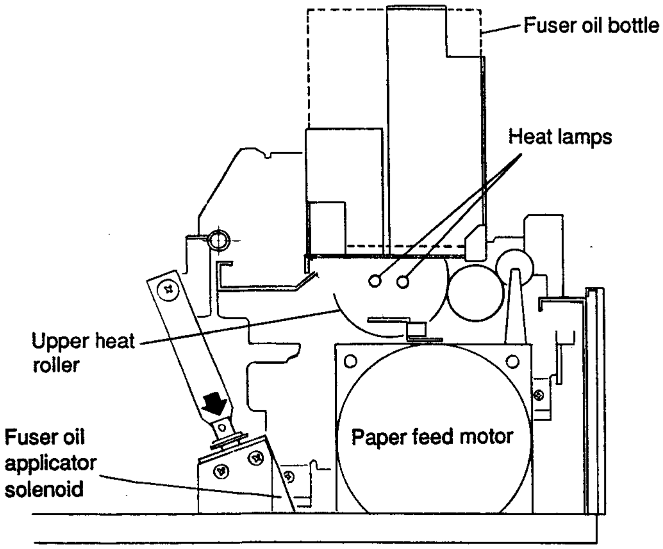
- Upper heat roller surface temperature: 180°C
- Thermal fuse rating: 169°C
- Heater lamp: 300W halogen lamp and 700W halogen lamp – 100V series

  350W halogen lamp and 700W halogen lamp – 200V series

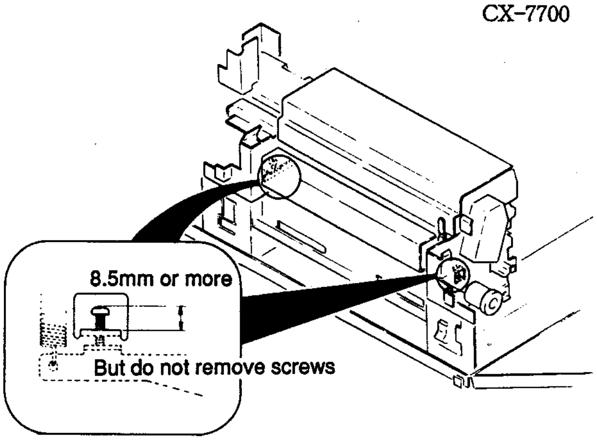
## 3. Block diagram


Thermal fuse
Thermostat
Oil applying roller
Oil applying blade
Thermistor
Oil supply roller
Upper cleaning roller
Fusing exit guide plate
Oil application plate
Oil tray
Paper-out roller
Heater lamp
Upper heat roller
Fusing entrance guide plate
Pressing spring
Pressing lever
Lower heat roller
Lower cleaning roller

(Front frame side)


Fuser oil bottle
Heat lamps
Upper heat roller
Fuser oil applicator solenoid
Paper feed motor

(Rear frame side)


8.5mm or more
But do not remove screws

## 4. Major parts and functions

### (1) Heat roller and cleaning roller

A silicon rubber roller is used for the upper and lower heat rollers. Cleaning rollers are used to clean the rollers.
For both cleaning rollers, heat resisting felt without oil impregnation is used.

### (2) Oil applicator

A silicon rubber roller is used to apply silicon oil to the heat rollers to prevent copy image offseting and paper separation problems.

### (3) Oil supply roller

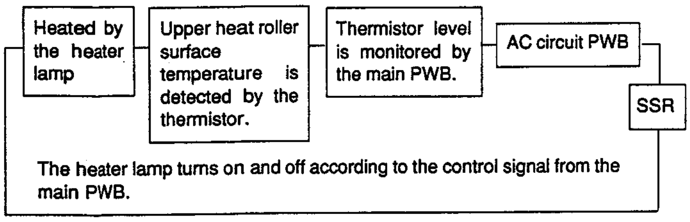
An aluminum roller is employed to insure stable supply of the silicon oil to the oil applicator roller.

### (4) Fuser guide plate

This guide plate is used to separate the copy paper.

### (5) Thermal controller

The fuser heat roller temperature controller consists of two halogen heater lamps, a thermistor, main PWB, and the AC circuit PWB.


Heated by the heater lamp
Upper heat roller surface temperature is detected by the thermistor.
Thermistor level is monitored by the main PWB.
AC circuit PWB
SSR
The heater lamp turns on and off according to the control signal from the main PWB.

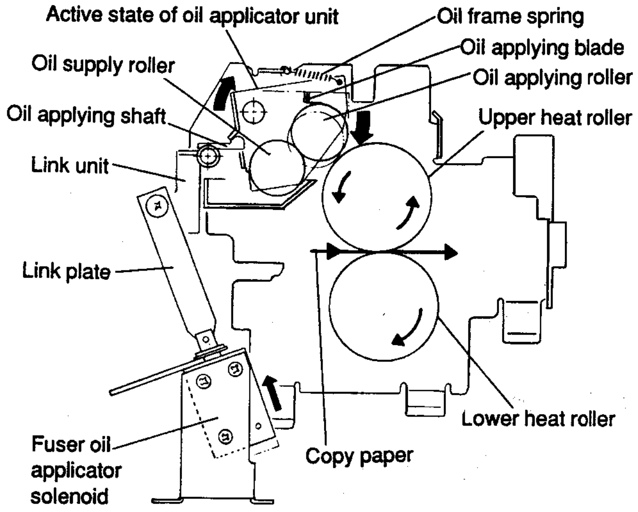
The upper heat roller surface temperature is programmed to 180°C.

To sense irregularly high heat roller temperature, the thermostat and the thermal fuse are employed.
If the thermostat or thermal fuse were to open, the primary side power supply to the heater lamps is shut off.

### (6) Heat roller tension and release

Pressure between the heat rollers is applied by spring tension on the lower heat roller tension arm.
The heat roller tension can be released using the tension arm adjusting screw.
Since the tension had been removed at the factory to protect the heat roller, it has to be loosened to add the appropriate tension.

### (7) Oil application theory


Active state of oil applicator unit
Oil frame spring
Oil applying blade
Oil applying roller
Upper heat roller
Oil supply roller
Oil applying shaft
Link unit
Link plate
Lower heat roller
Fuser oil applicator solenoid
Copy paper

The oil applicator unit, oil reservoir, oil applicator axle, link unit, link plate, solenoid, and drive system comprise the oil applicator system.

# 5. Major parts disassembly, re-assembly, replacement, cleaning

## A. List

| Item No. | Parts name | | | When replacement required | When cleaning cycle required | Refer page |
|---|---|---|---|---|---|---|
| (1) | Heater lamp | | 700W | | | 13-3 |
| | | | 300W | | | |
| (2) | Fuser oil | | | | | 13-4 |
| | a | Oil | | At maintenance (every 10K copies) | At every maintenance | 13-4 |
| | b | Oil tray unit | | | | 13-4 |
| | c | Used oil bottle | | At maintenance (every 10K copies) | At every maintenance | 13-4 |
| (3) | Heat roller | | | | | 13-5 |
| | a | Upper heat roller | | At maintenance (every 10K copies) | At every maintenance | 13-5 |
| | b | Lower heat roller | | At maintenance (every 40K copies) | At every maintenance | 13-5 |
| | c | Upper cleaner roller | | At maintenance (every 20K copies) | At every maintenance | 13-6 |
| | d | Lower cleaner roller | | At maintenance (every 20K copies) | At every maintenance | 13-6 |
| (4) | a | Thermistor, | | | At every maintenance | 13-6 |
| | b | Thermal fuse, | | | | |
| | c | Thermostat | | | | |
| (5) | Fuser guide plate | | | | At every maintenance | 13-7 |
| (6) | Fuser blade | | | At maintenance (every 20K) | At every maintenance | 13-4 |

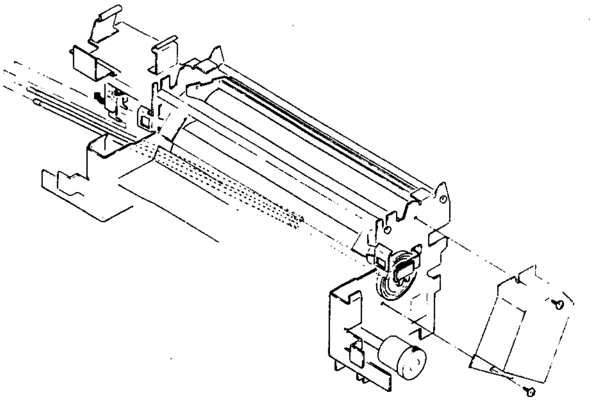
(Note) Fuser oil consumption largely differs from use conditions of the machine.
The replacement cycle of the oil bottle (every 10K copies in the above table), therefore, may be lengthened to about 20K copies if a lot of multi-copies are made.)

## B. Methods

### (1) Heater lamp removal

① Remove the heater cover of the fuser unit (two screws).

② Rotate the electrode in the arrow direction (figure) and remove the heater lamp.

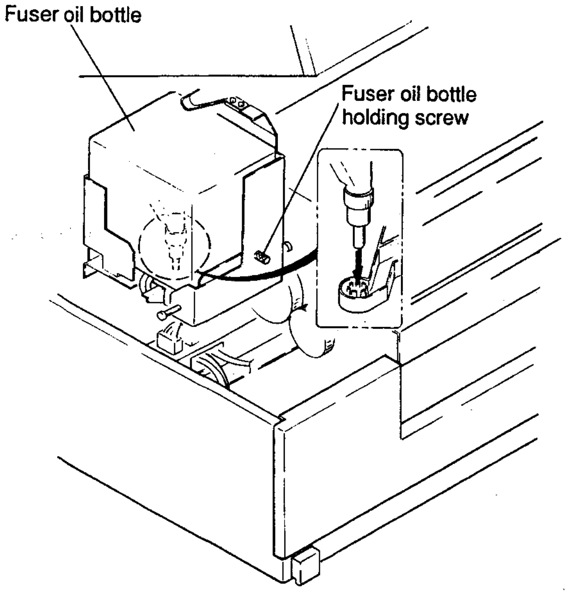


NOTE: The size of the 300W heater lamp is 10mm shorter than the 700W heater lamp. Because the light exposure is not symmetrical for the heater lamp, the side with the wattage printed must be installed on the front frame side.

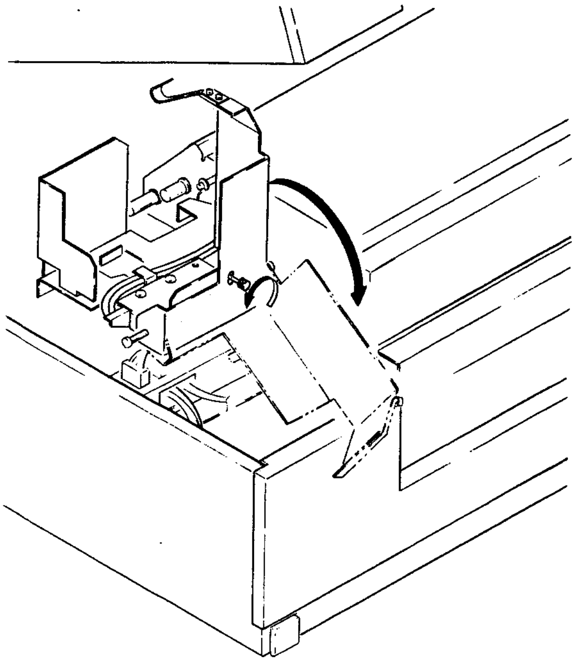
## (2) Fuser oil

### a. Removing the oil bottle.

① Remove the oil bottle holding screw and remove the fuser oil bottle.


Fuser oil bottle
Fuser oil bottle holding screw

Note: When the fuser oil bottle is removed from the oil tray; a small quantity of oil may flow from the oil valve tip. This is not oil leakage.



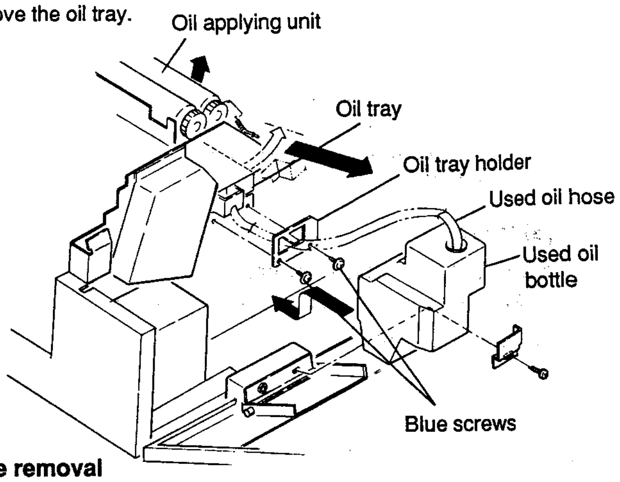
② When the Fuser oil bottle is replaced, the Used oil bottle should be exchanged to new bottle at same time.

### b. Oil tray removal

① Remove the hose of used oil bottle.

② Loosen the two blue screws (F and R) which fix the oil frame fixing plate, and remove the oil applying unit.

③ Remove the oil tray.


Oil applying unit
Oil tray
Oil tray holder
Used oil hose
Used oil bottle
Blue screws

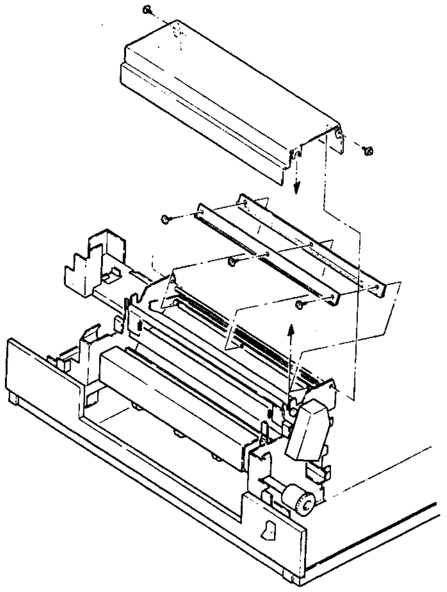
### c. Blade removal

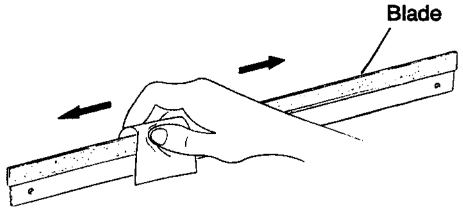
① Remove the fuser cover.

② Remove the blade holding plate, 3 screws.

③ Remove the blade.

④ Cleaning, damper a dry cloth with a small amount of fuser oil and apply oil to the edge of the blade.





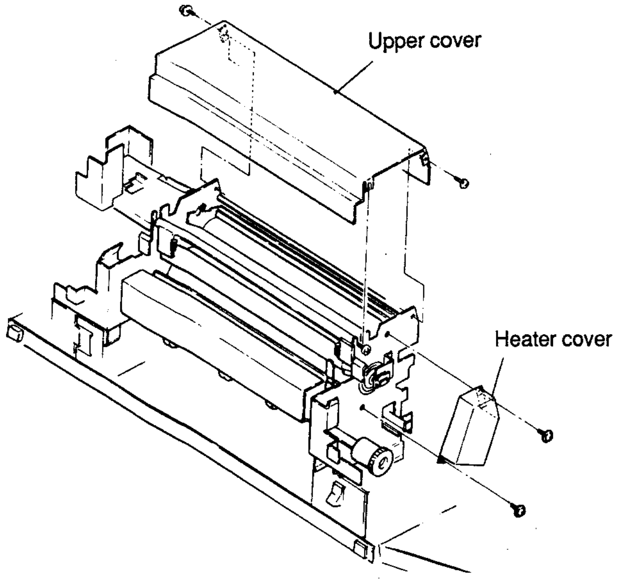
Note: When attaching the blade, set the blade so that the blade No. faces upward (in the rear side).
If it is attached reversely, oil supply to the heat roller may be uneven.

## (3) Heat rollers

### a. Upper heat roller removal

① Remove the fuser unit top cover and the heater cover.

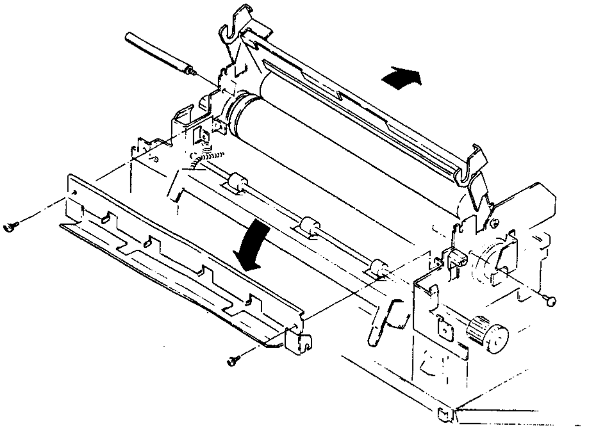
② Remove the two heater lamps.


Upper cover
Heater cover

③ Tilt the paper exit holder forward.

④ Remove the pawl holder (two screws).

⑤ Remove the two screws on the front and rear side of the paper exit side out of the thermistor bracket holding four screws, then lift up the thermistor bracket to remove.



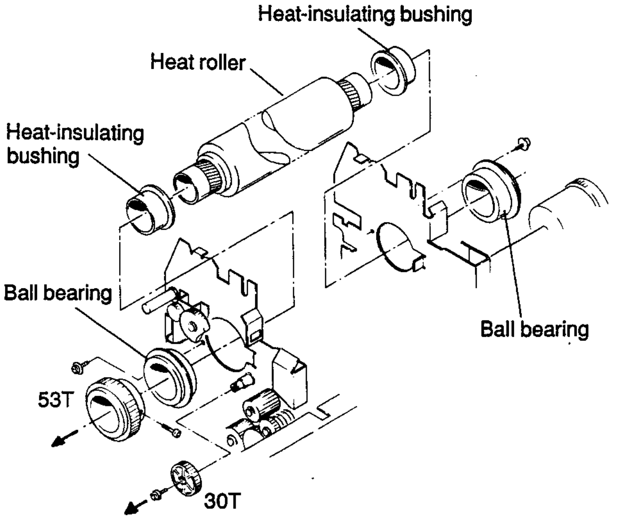
⑥ Tighten the blue tension adjusting screw all the way down.

⑦ Remove the gear 30T holding screw on the rear frame side, then pull out the gear.

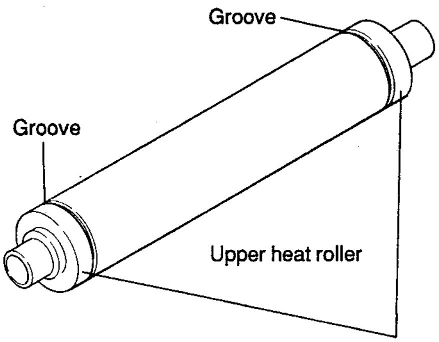
⑧ Remove the bearing holder screws, front and rear.

⑨ Remove the 53T gear holding screw and remove the gear, rear bearing and rear bushing.

⑩ Remove the front side bearing and bushing, then remove the upper heat roller to the rear frame side and take it out.


Heat-insulating bushing
Heat roller
Heat-insulating bushing
Ball bearing
Ball bearing
53T
30T

Note: When installing the upper heat roller, apply a small quantity of triflon to the both journals of the heat roller (shaded sections).


Groove
Groove
Upper heat roller

Apply silicone oil here when installing a new upper heat roller.
Apply silicone oil also to the thermistor contact.

There are grooves at both sides of the upper heat roller surface. These grooves are provided to prevent the oil from migrating to the bearings. As the length of the oil applicator roller is the same as the groove, the copy paper remains within in this range.

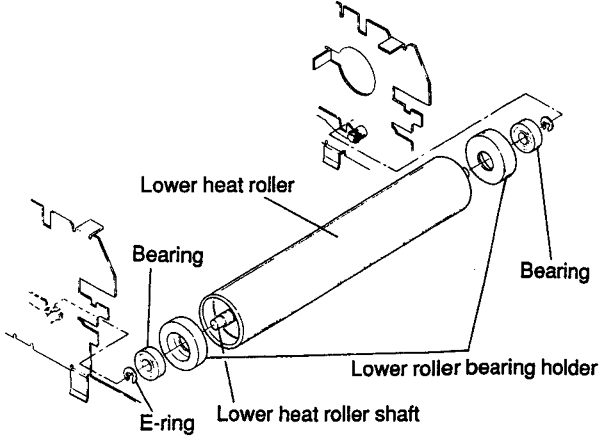
Note: When a new upper heat roller is installed, apply a few drops of silicone oil to the outsides of the grooves.

### b. Lower heat roller removal

① Remove the upper heat roller, in reference to (3)-a.

② Remove the lower heat roller from the frame.

③ Remove the E-ring, bearings, and bearing holders from the lower heat roller.


Lower heat roller
Bearing
Bearing
Lower roller bearing holder
E-ring
Lower heat roller shaft

### c. Upper cleaner roller replacement

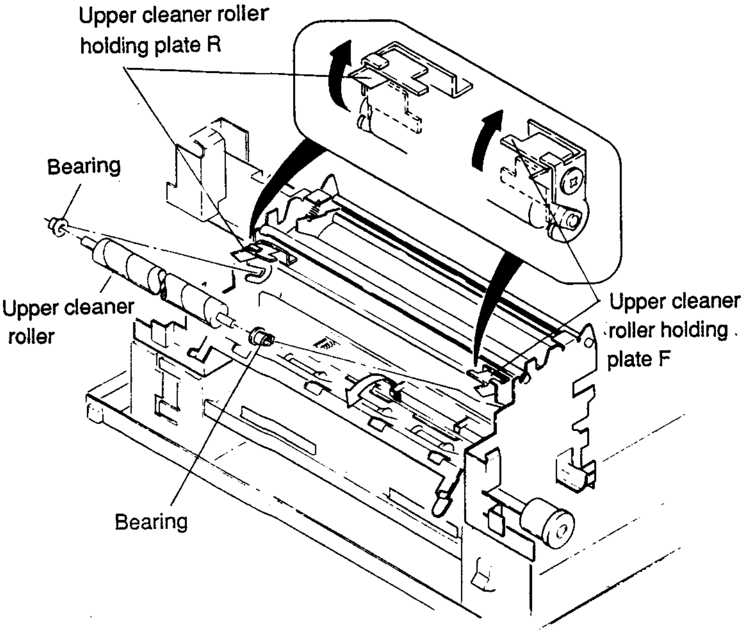
① Remove the fuser top cover (two screws).

② Tilt the paper exit holder forward.

③ Lift up the upper cleaner roller holding plates (F, R).

④ Lift up the cleaner roller to remove.

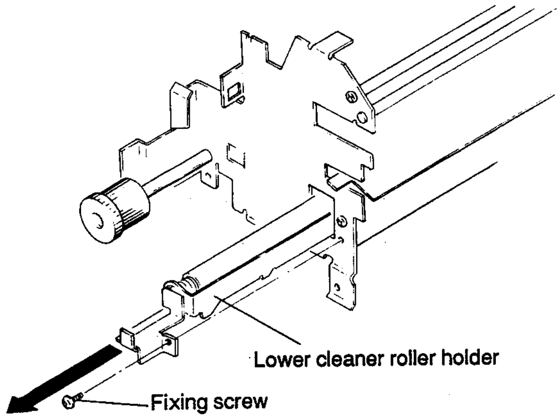
- When the cleaner roller is installed, rotate the heat roller to make sure that the cleaner roller also rotates.


Upper cleaner roller holding plate R
Bearing
Upper cleaner roller
Upper cleaner roller holding plate F
Bearing

### d. Lower cleaner roller replacement

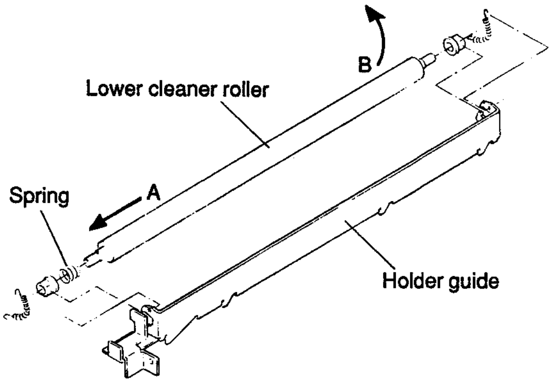
① Remove the lower cleaner roller fixing screw.

② Take out the lower cleaner roller holder from the fuser unit.


Lower cleaner roller holder
Fixing screw

③ Move the front frame side lower cleaner roller bearing in the arrow direction A. and remove the lower cleaner roller from the cleaner holder by lifting in arrow direction B.

- When replacing the cleaning roller holder, the guide of the cleaner roller holder must be under the fuser guide plate.

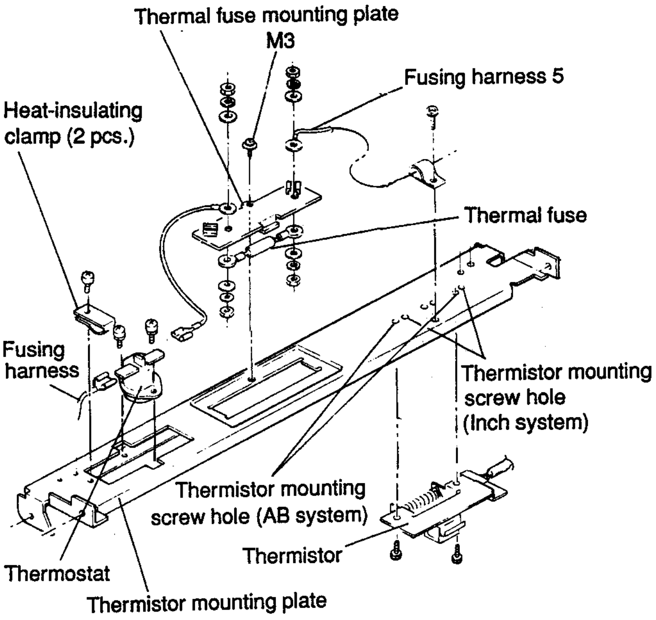

B
Lower cleaner roller
Spring
A
Holder guide

### (4) Thermistor, thermal fuse, thermostat

① Remove the fuser cover (two screws).

② Remove the screw that holds the thermal fuse mounting plate and remove the screws which secure the thermal fuse and lead wires.

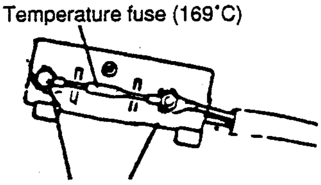
③ Unfasten the wire leads to the thermostat, then remove the two screws and lift up.


Thermal fuse mounting plate
M3
Fusing harness 5
Heat-insulating clamp (2 pcs.)
Thermal fuse
Fusing harness
Thermistor mounting screw hole (Inch system)
Thermistor mounting screw hole (AB system)
Thermistor
Thermostat
Thermistor mounting plate

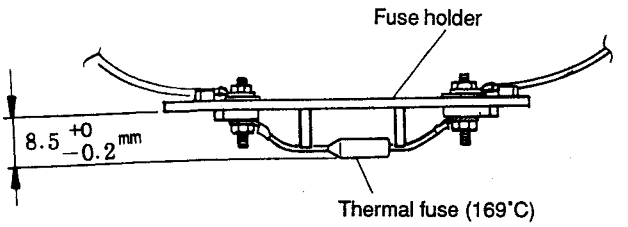
④ When the thermistor is to be replaced, remove the two screws (F, R) on the paper exit side out of four thermistor bracket holding screws and rotate the thermistor holding bracket upward in the same manner as described for the heat roller replacement procedure. Unfasten the connector on the rear frame side, then remove the two screws that hold the thermistor bracket.

NOTES: 1: When replacing the thermistor, note the AB and inch types (see the figure above).

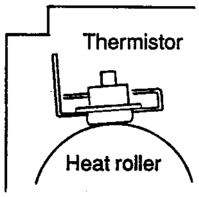
⑤ Thermistor and thermal fuse
Check the thermal fuse to see that it is mounted properly.


Temperature fuse (169°C)

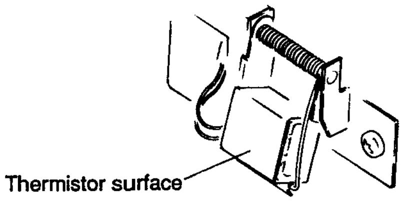
The thermal fuse must be installed as pictured below.


Fuse holder
8.5 +0 −0.2 mm
Thermal fuse (169°C)

The center of the thermistor must be in direct contact with the heat roller.


Thermistor
Heat roller

Remove toner buildup on the thermistor surface. Clean away the dust at every 10,000 copies. Be careful not to scratch the mylar surface or saturate the pad with fluid.

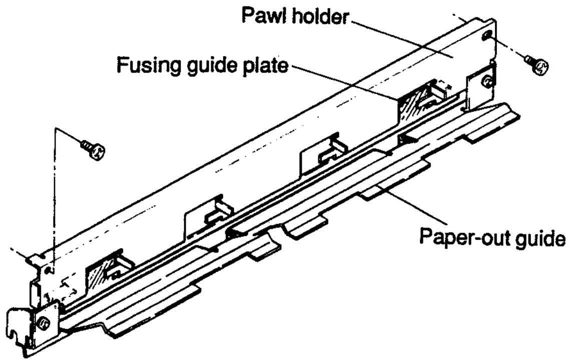

Thermistor surface

## (5) Fuser guide plate cleaning

① Remove the fuser top cover.

② Tilt the paper exit holder forward.

③ Remove the two pawl holder screws.


Pawl holder
Fusing guide plate
Paper-out guide

(Rear frame side)

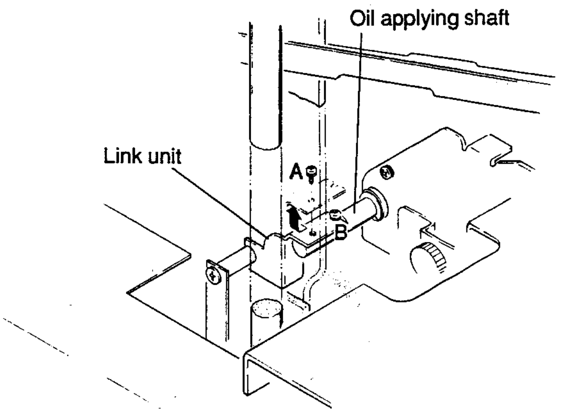
Note: When installing the pawl holder to the fuser unit, place it toward the rear frame side. Be careful not to deform the parts.

④ While pressing the shadowed portion of the fuser guide (see figure above), remove the pawl holder. (Same applied when replacing.)

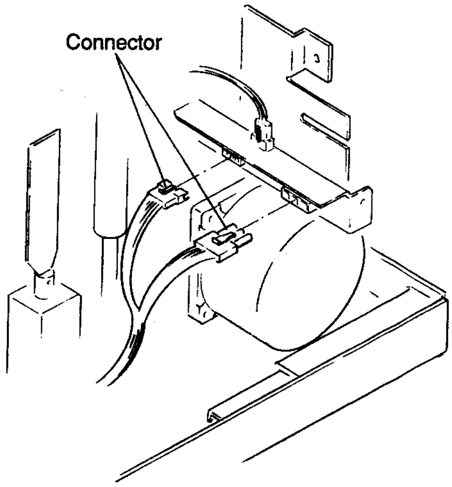
⑤ Clean the paper path of the fuser guide plate using a soft, clean cloth. Cleaning is needed at every 10,000 copies.

## (6) Fuser unit removal

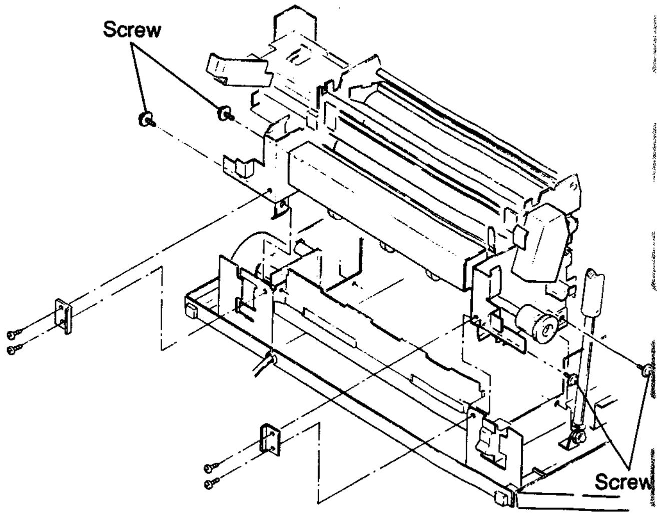
- Remove the rear lower panel. Remove the link unit and oil applicator shaft holding screw A, then loosen the screw B.


Oil applying shaft
Link unit
A
B

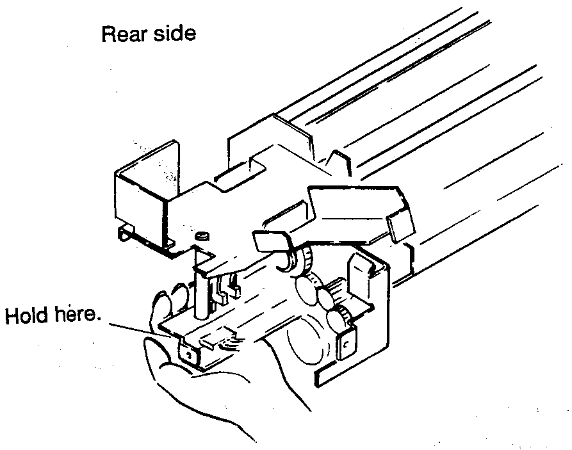
- Remove the oil reservoir.
- Remove the two connectors from the connector holding bracket.

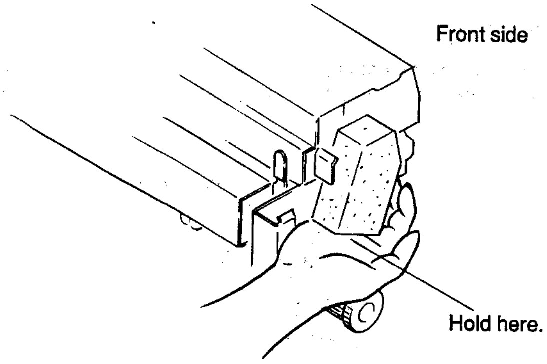


- Remove the fuser oil sensor.
- Remove the two screws on each of the front and rear frame sides.
- Remove 4 screws and 6 rackets on copier exit.


Screw
Screw

- Lift up the unit as shown in the figure and remove it from the machine.



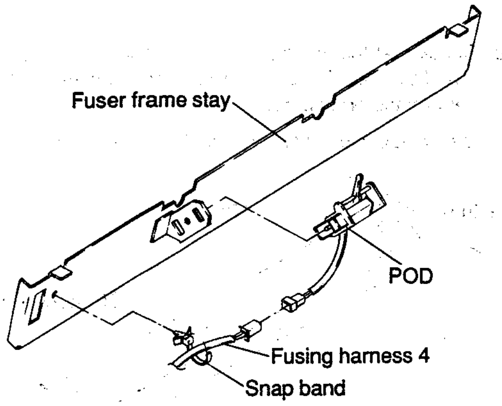


NOTE: Do not touch the "x" marked area.

### (7) POD sensor removal

① Remove the fuser unit from the copier.

② Remove the POD sensor from the fuser frame stay.



## 6. Adjustments

### (1) Fuser solenoid adjustment procedure

① Check the machine level.

② Check the oil tray spacer.

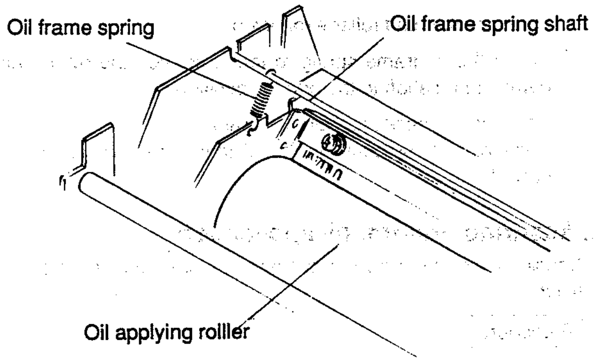
(Reference) The normal oil level height in the oil tray is 5 mm or more at the front and the rear sides.

(Note) Do note remove the oil tank when it is hot. If removed, oil may flood out because of expansion of air inside the oil tank.

③ Fusing oil applying solenoid adjustment procedure.

Check item

When fixing the oil applying roller unit to the fuser unit, check that the oil frame holding shaft is attached to the lowest position of the U-shape groove of the fuser frames F and R.



Insert a paper between the oil applying roller and the fuser roller, manually push the solenoid plunger, and check that the paper is not easily removed.

(Check the center in the front side, and three positions in the rear side.)

(Note) When the machine is opened, the link unit should not be in contact with the holding shaft.

(Adjustment procedure)

① Remove the oil frame spring which is fixing the oil frame front side.

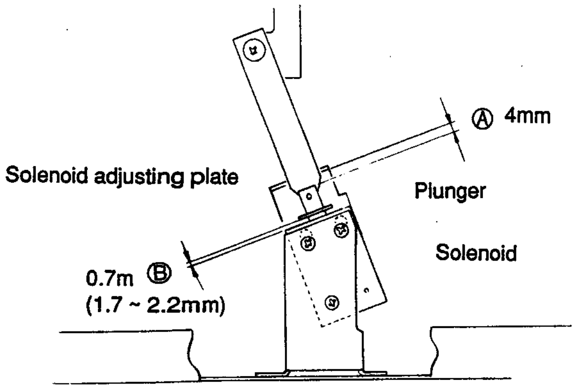
② Loosen the mounting plate fixing screw which is fixing the solenoid.

③ Shift the oil frame spring shaft to the front side so that the oil applying roller comes in contact with the fuser roller by it own weight.

④ Push the oil frame in the arrow direction, rotate the fuser knob to engage the 18T gear with the 28T gear.

⑤ Close the clamshell.

⑥ Under this state, move the solenoid up and down to adjust the clearance between the plunger E-ring and the solenoid.


Ⓐ 4mm
Solenoid adjusting plate
Plunger
Solenoid
0.7m Ⓑ
(1.7 ~ 2.2mm)

Ⓐ: Solenoid actual stroke
Ⓑ: Adjustment value when the machine is cold.
( ): Adjustment value (rough standard) when the heat roller is hot.
* By the heat roller expansion

⑦ Attach the oil frame spring to the oil frame, and return the oil frame spring shaft to the original position.

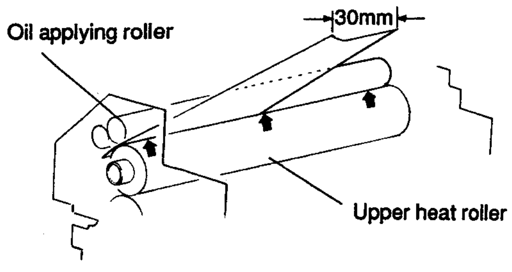
⑧ Check the "Check item" above again.
If the contact pressure is insufficient, repeat the procedures from ①).

## (2) Assuring uniform oil application

① Checking pressure between the applying roller and the upper heat roller

Procedure

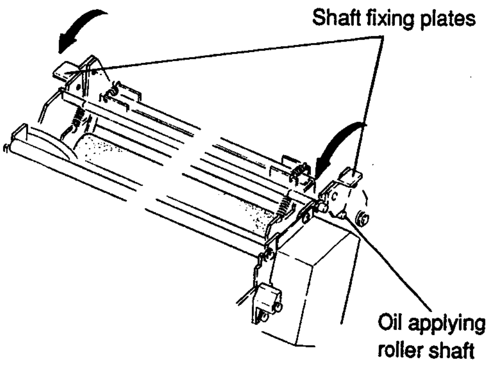
Insert a plain paper of 30mm wide between the applying roller and the upper heat roller. Push the fuser solenoid plunger section, and check the contact pressure of the rollers at the front, the center, and the rear (3 positions).


Oil applying roller
30mm
Upper heat roller

Note: Check that the link boss is not in contact with the holding rod. If they are in contact, close the clamshell halfway and perform the procedure.

If contact pressures are even, go to 2).

If contact pressures are not even, check the installation of the oil applying roller shaft for looseness and readjust the installation of the oil applying roller shaft fixing plate.

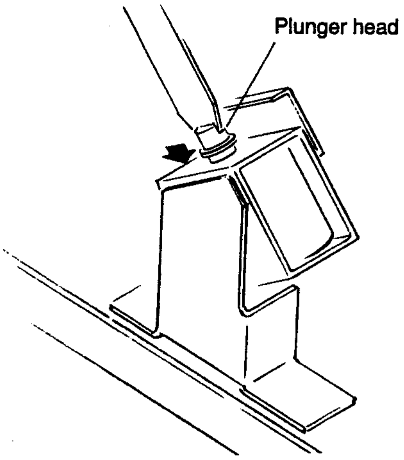

Shaft fixing plates
Oil applying roller shaft

After readjustment, check again and go to 2).

② Checking oil supply to the oil application roller

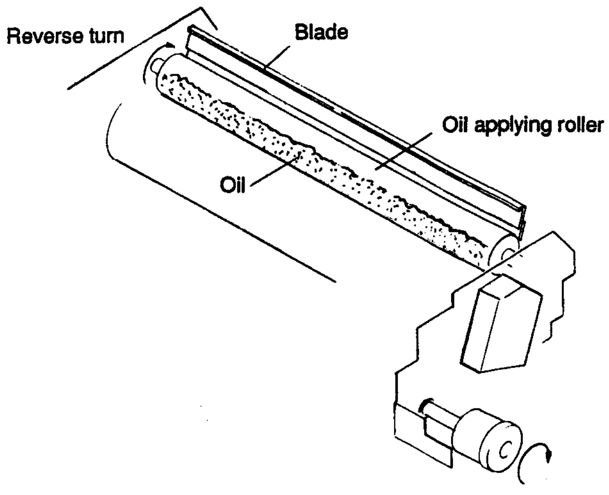
Procedure

Push the solenoid plunger head with a finger and turn the fuser knob clockwise to turn the application roller reversely. (See the figure.)


Plunger head

Note: Check that the link boss is not in contact with the holding rod. If they are in contact, close the clamshell halfway and perform the procedure.

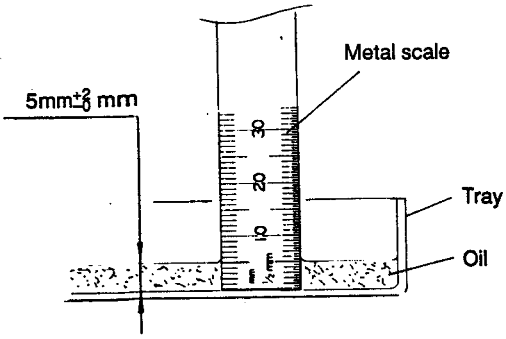
Check the condition of oil supplied to the applying oil.


Reverse turn
Blade
Oil applying roller
Oil

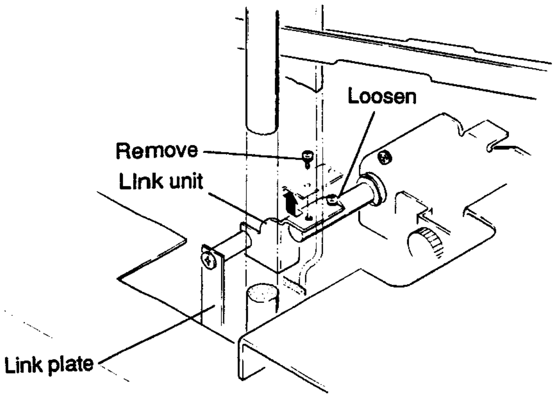
If oil condition on the roller is not uniform, perform the procedure below:

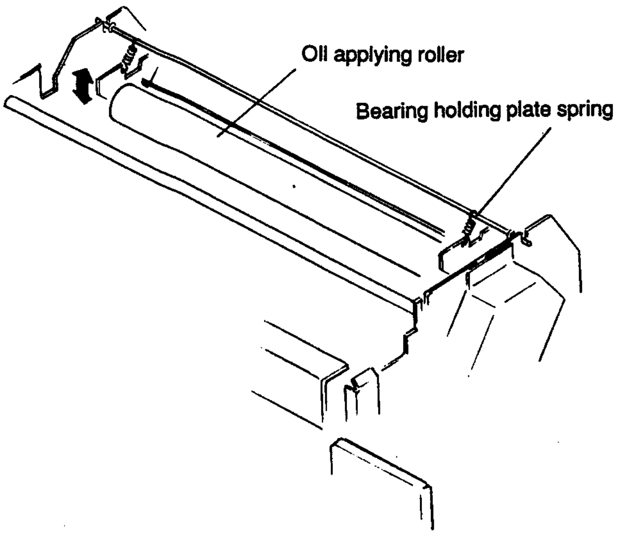
2-1) Checking oil level

Check that the oil level is 5mm $^{+2}_{-0}$mm at the rear of the oil tray. If the oil level is lower than 5mm, check for unbalance between the level at the front and the level at the rear and check the machine level.


Metal scale
5mm$^{+2}_{-0}$ mm
30
20
10
Tray
Oil

2-2) Checking pressure between the oil supplying roller and the oil applying roller

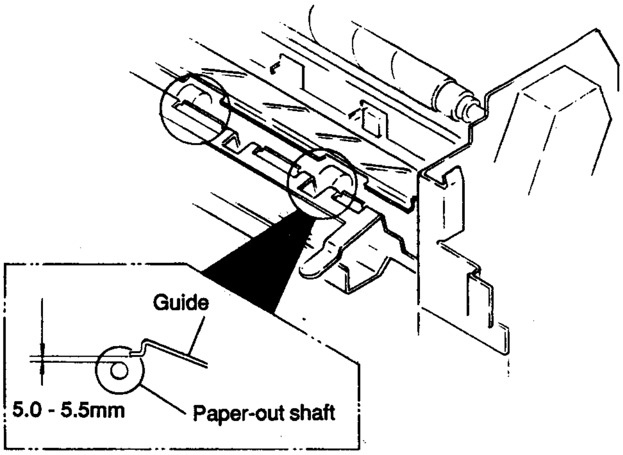

Loosen
Remove
Link unit
Link plate


Oil applying roller
Bearing holding plate spring

## (3) Paper guide height

- Check the paper guide height in case of accordion jam at the paper out section or offset at the center of A3/B4 paper.

Check that the clearance between the paper guide and the paper-out shaft is 5mm ~ 5.5mm.


Guide
5.0 - 5.5mm
Paper-out shaft

## (4) Abnormal noise in the gear section

① Abnormal noise when the solenoid is OFF (warm-up or ready mode)

1-1) Check that the oil frame spring is extended or not. If it is extended, replace with a new one.
(For temporarily treatment, cut the spring one or two turns so that the gear may not be in contact when the solenoid is off.)

1-2) Check that the solenoid adjusting plate stroke is 4.0mm.

1-3) Check that the solenoid clearance is 0.7mm.

② Abnormal noise when the solenoid is ON (during copying)

2-1) Check that oil is supplied to the oil applying roller.

Checking procedure

Push the solenoid to turn the oil applying roller reversely. If there is no oil on the roller, check the installation of the oil tank.

2-2) Check the solenoid adjusting plate stroke and the solenoid clearance.

# [14] DISASSEMBLY, REPLACEMENT OF SUPPLIES/PARTS AND ADJUSTMENTS

When disassembly or supplies/parts replacement is made, the relative procedures of adjustment or setting are required as shown below. The required procedures are listed on the left side and the next required procedures are on the right side.

## 1. Disassembly, supplies/parts replacement

| Section | Item No. | Description | Ref page | Next required pocedures |
|---|---|---|---|---|
| [Paper feed section] | (1) | Resist roller drive system (clutch, etc.) disassembly<br>Replace the resist roller and the resist roller drive system parts (clutch, etc.). | 7-7 | Go to A-8. |
| | (2) | Cassette paper feed roller drive system (clutch, etc.) disassembly<br>Replace the cassette paper feed roller drive system parts (clutch, etc.). | 7-8 | Go to A-1. |
| | (3) | Manual paper feed roller drive system parts (clutch, etc.) disassembly<br>Replace the manual paper feed roller drive system parts (clutch, etc.). | 7-10 | Go to A-3. |
| | (4) | Transport roller drive system parts (clutch, etc.) disassembly<br>Replace the transport roller drive system parts (clutch, etc.). | 7-9 | Go to A-5. |
| | (5) | OHP sensor replacement | 7-8 | Go to A-7. |
| [Optical section] | (6) | AE sensor replacement<br>Clean the AE sensor. | 8-9 | Go to B-13. |
| | (7) | Reflector replacement<br>Clean the reflector.. | 8-8 | Go to B-1. |
| | (8) | Mirror home position sensor (MHPS1) replacement | | Go to B-9. |
| | (9) | Lens replacement | 8-14 | Go to B-4. |
| | (10) | Lens home position sensor (LHPS) replacement<br>Adjust the lens home position sensor (LHPS) position. | 8-30 | Go to B-5. |
| | (11) | Filter home position sensor (FHPS) replacement<br>Adjust the filter home position sensor (FHPS) position. | 8-19 | Go to B-11. |
| | (12) | Mirror base A disassembly<br>Replace mirror base A. | 8-8 | Go to B-1/B-4. |
| | (13) | Mirror base B disassembly<br>Replace mirror base B. | 8-11 | Go to B-2/B-4. |
| | (14) | Mirror base drive wire peripheral section disassembly<br>Replace the mirror base drive wire. | 8-12 | Go to B-4. |
| | (15) | Glass holder plate replacement<br>Adjust the glass holder plate position. | | Go to B-7. |
| | (16) | Blank lamp disassembly<br>Replace the blank lamp. | 9-9<br>9-6 | Go to B-8. |
| | (17) | Exposure adjustment plate replacement<br>Adjust the exposure adjustment plate position. | | Go to B-1. |
| | (18) | Copy lamp replacement | 8-8 | Go to B-1. |
| | (19) | Copy lamp control PWB replacement<br>Replace the parts in the copy lamp control PWB. | | Go to B-12. |
| | (20) | Screen cleaning<br>Screen replacement<br>Screen disassembly | 8-19 | Go to B-16. |
| | (21) | Optical system cleaning | | Go to B-7/B-13. |
| [PC section] | (22) | PC belt replacement | 9-5 | Go to C-1. |
| | (23) | PC belt cleaner unit disassembly<br>(Replacement of parts in the PC belt cleaner unit.) | 9-10 | Go to C-3/C-5. |
| | (24) | Replace the PC belt cleaner blade or clean the PC belt cleaner blade. | 9-10 | Go to (44). |
| | (25) | Main corona unit replacement | 9-4 | Go to C-2. |
| | (26) | Main corona/DV bias PWB unit replacement | 9-15 | Go to C-2/D-3. |
| [Developer section] | (27) | Developer (Y, M, C) replacement | 11-4 | Go to D-1. |
| | (28) | Developer (BK) replacement | 11-4 | Go to D-2 |
| | (29) | Developer unit disassembly<br>(Developer roller replacement)<br>(DV doctor replacement) | 11-8 | Go to D-4. |
| | (30) | Developing clutch disassembly<br>Replace the developing clutch. | 11-11 | Go to D-7. |

| Section | Item No. | Description | Ref page | Next required pocedures |
|---|---|---|---|---|
| [Developer section] | (31) | Stirring clutch disassembly<br>Replace the mix clutch. | 11-11 | Go to D-8. |
| [TX section] | (32) | TX belt replacement | 10-4 | |
| | (33) | Primary transfer roller replacement | 10-7 | Go to E-3. |
| | (34) | Primary transfer roller high voltage PWB unit (FRHVG) replacement | | Go to E-3. |
| | (35) | Secondary transfer roller high voltage PWB (SRHVG) unit replacement | 10-12 | Go to F-1. |
| | (36) | Secondary transfer roller drive system disassembly<br>Replace the secondary transfer roller clutch. | 10-7 | Go to F-2. |
| | (37) | TX belt cleaner unit disassembly<br>Replace the parts in the TX belt cleaner unit. | 10-9 | Go to E-5, E6, E7. |
| | (38) | Gamma sensor PWB unit replacement<br>Replace the parts in the gamma sensor PWB unit. | 10-12 | Go to E-1. |
| [Fusing section] | (39) | Fusing oil sensor and its input PWB replacement<br>Fusing oil sensor input PWB parts replacement. | 13-2 | Go to H-1. |
| [Others] | (40) | DC power PWB unit replacement<br>Replace the parts in the DC power PWB unit. | 15-1 | Go to I. |
| | (41) | Slave PWB unit replacement<br>Replace VR201 in the slave PWB unit. | | Go to B-13. |
| | (42) | Main PWB IC160 replacement<br>Replace IC102 in the main PWB.<br>Replace VR102/103/104 in the main PWB. | 14-10 | Go to D-3. |
| | (43) | Main PWB VR101 replacement | | Go to A-7. |
| | (44) | The PC belt covered by BK toner (use test command 37 mode 3).<br>Caution: To operate test command 37 mode 3 without PC cleaner unit. | 3-13 | Go to (45) |
| | (45) | Install the PC cleaner unit | 9-10 | |

## 2. Adjustment

| Section | Item No. | Description | Spec | Adjustment | Test command No. | Tool | Ref page | Next required pocedures |
|---|---|---|---|---|---|---|---|---|
| [Paper feed section] | A-1 | Cassette paper feed roller clutch clearance adjustment | 0.15 ± 0.05mm | Clutch boss |  | • Hex wrench<br>• Thickness gauge | 7-11 | Go to A-2. |
|  | A-2 | Cassette paper feed roller/ clutch solenoid position adjustment |  |  |  |  | 7-11 |  |
|  | A-3 | Manual paper feed roller clutch clearance adjustment | 0.15 ± 0.05mm | Clutch boss |  | • Hex wrench<br>• Thickness gauge | 7-12 | Go to A-4. |
|  | A-4 | Manual paper feed roller/clutch solenoid position adjustment |  |  |  |  | 7-11 |  |
|  | A-5 | Transport roller clutch clearance adjustment | 0.15 ± 0.05mm | Clutch boss |  | • Hex wrench<br>• Thickness gauge | 7-12 | Go to A-6 |
|  | A-6 | Transport roller/clutch solenoid position adjustment |  |  |  |  | 7-11 |  |
|  | A-7 | OHP film detection level adjustment<br>(Adjust with the main PWB VR101.) |  | Main PWB VR101 |  | Small minus driver | 7-12 |  |
|  | A-8 | Resist roller clutch clearance adjustment | 0.15 ± 0.05mm | Clutch boss |  | • Hex wrench<br>• Thickness gauge | 7-12 | Go to B-9. |
| [Optical system] | B-1 | Uniformity adjustment<br>(Adjust the mounting position of the exposure correction plate.) |  | Exposure control plate (setting position) | 46 | Half tone document | 8-31 | Go to B-13/G-1/ G-2/G-3/G-4/ G-5/G-6. |
|  | B-2 | Horizontal image distortion adjustment<br>(Adjust with the No. 2 mirror horizontal parallelism adjusting screw in the mirror base A.) | No distortion | No. 2 mirror horizontal parallelism adjusting screw in the mirror base A |  | Plus screwdriver | 8-20 | Go to B-3. |
|  | B-3 | Vertical image distortion adjustment<br>(Adjust with the mirror base A vertical parallelism adjust screw.) | No distortion | Mirror base A vertical parallelism adjusting screw |  | • Plus screwdriver | 8-21 | Go to B-4. |

<table>
<tr><th>Section</th><th>Item No.</th><th>Description</th><th>Spec</th><th>Adjustment</th><th>Test command No.</th><th>Tool</th><th>Ref page</th><th>Next required pocedures</th></tr>
<tr><td>[Optical system]</td><td>B-4</td><td>Focus adjustment<br>(Adjust the mirror base A mounting position in reference to the mirror base drive wire.)</td><td>(Unit: lines/mm)
<table>
<tr><th>Copy magnification ratio</th><th>Copy center</th><th>Copy corner</th></tr>
<tr><td>Normal (100%)</td><td>5.0</td><td>4.5</td></tr>
<tr><td>Enlargement (101 ~ 154%)</td><td>5.0</td><td>4.5</td></tr>
<tr><td>Reduction (99 ~ 90%)</td><td>4.5</td><td>3.6</td></tr>
<tr><td>Reduction (89 ~ 75%)</td><td>3.6</td><td>3.2</td></tr>
<tr><td>Reduction (74 ~ 64%)</td><td>3.6</td><td>3.2</td></tr>
</table></td><td>Wire fixing plate in the mirror base A</td><td></td><td>Resolution test chart</td><td>8-21</td><td>Go to B-5.</td></tr>
<tr><td></td><td>B-5</td><td>Vertical copy magnification ratio adjustment</td><td>99.75 ± 0.1% (At copy magnification ratio is displayed as 100%)</td><td>Lens home position (setting value)</td><td>48</td><td>Scale</td><td>8-22</td><td>Go to B-6.</td></tr>
<tr><td></td><td>B-6</td><td>Horizontal copy magnification ratio adjustment</td><td>100.25 ± 0.1% (At copy magnification ratio is displayed as 100%)</td><td>Mirror base scan speed (setting value)</td><td>49</td><td>Scale</td><td>8-23</td><td>Go to B-9.</td></tr>
<tr><td></td><td>B-7</td><td>Image center position adjustment<br>(Adjust by changing the glass holding plate mounting position.)</td><td>0 ± 2mm</td><td>Glass holding plate</td><td></td><td>Scale</td><td>8-25</td><td>Go to B-8/B-9.</td></tr>
<tr><td></td><td>B-8</td><td>Blank lamp position adjustment<br>(Adjust by changing the blank lamp position adjusting plate mounting position.)</td><td>0 ± 1mm</td><td>Blank lamp position adjusting plate</td><td></td><td>Plus screwdriver<br>Scale</td><td>9-16</td><td>Go to B-10.</td></tr>
<tr><td></td><td>B-9</td><td>Lead edge image position adjustment</td><td>0 ± 1mm</td><td>Mirror base scan start timing. (setting value)</td><td>50</td><td>Scale</td><td>8-28</td><td>Go to B-10.</td></tr>
<tr><td></td><td>B-10</td><td>Lead edge image loss/void area adjustment</td><td>Image loss 5 ± 1.5mm<br>void area 5 ± 0.5mm</td><td>Blank lamp OFF timing (setting value)</td><td>58</td><td>Scale</td><td>8-28</td><td></td></tr>
<tr><td></td><td>B-11</td><td>Filter set position adjustment<br>(Adjust by changing the filter home position sensor (FHPS) mounting position.)</td><td></td><td>Filter home-position sensor</td><td></td><td>Scale</td><td>8-29</td><td></td></tr>
<tr><td></td><td>B-12</td><td>Reference copy lamp applying voltage adjustment<br>(Use test command 7 mode 2 and adjust with VR401 in the copy lamp control PWB.)</td><td>
<table>
<tr><th>Power spec.</th><th>CLC PWB<br>Voltage between Vrms and GND</th></tr>
<tr><td>200V, 50Hz</td><td>7.8 ± 0.05V</td></tr>
<tr><td>220/240V, 50Hz</td><td>7.85 ± 0.05V</td></tr>
<tr><td>220, 60Hz</td><td>7.9 ± 0.05V</td></tr>
<tr><td>100V system, 50Hz</td><td>7.85 ± 0.05V</td></tr>
<tr><td>100V system, 60Hz</td><td>7.9 ± 0.05V</td></tr>
</table></td><td>CLC PWB<br>VR401</td><td>7-2</td><td>• Small minus driver<br>• Digital multmeter</td><td>8-30</td><td></td></tr>
</table>

<table>
<tr><th>Section</th><th>Item No.</th><th>Description</th><th>Spec</th><th>Adjustment</th><th>Test command No.</th><th>Tool</th><th>Ref page</th><th>Next required pocedures</th></tr>
<tr><td>[Optical system]</td><td>B-13</td><td>AE sensor input level adjustment<br>(Use test command 55 and adjust with VR201 in the slave PWB.)</td><td>60 ± 1</td><td>Slave PWB VR201</td><td>55</td><td>Small minus driver</td><td>8-32</td><td>Go to B-14/B-15.</td></tr>
<tr><td></td><td>B-14</td><td>AE sensor limit level setting<br>(Use test command 55/52 for setting.)</td><td>Max level – 51<br>minimum level – AE sensor output average level +3</td><td>Setting value</td><td>55/52</td><td>White paper</td><td>8-34</td><td>Go to G-11.</td></tr>
<tr><td></td><td>B-15</td><td>AE sensor output characteristics memory<br>(Use test command 47.)</td><td></td><td></td><td>47</td><td>White paper</td><td>8-33</td><td>Go to G-12.</td></tr>
<tr><td></td><td>B-16</td><td>Screen position adjustmen</td><td>Parallel (1.7±0.2mm apart from the PC belt)</td><td>Screen position</td><td></td><td>Black gauge</td><td>8-35</td><td>Go to G-2/G-4/G-6/G-9/G-10/G-11.</td></tr>
<tr><td>[PC section]</td><td>C-1</td><td>PC belt sensitivity setting<br>(Use test command 45 for setting.)</td><td></td><td>Setting value</td><td>45</td><td></td><td>3-14</td><td></td></tr>
<tr><td></td><td>C-2</td><td>Main corona grid voltage adjustment<br>(Use test command 57 for adjustment,a nd use test command 9 for check.)</td><td><table>
<tr><th colspan="2">Copy mode</th><th>Main corona grid voltage adjustment voltage</th></tr>
<tr><td>Full color and monochrome</td><td>Graphic</td><td>–335 + (Memo sheet No. 38 set value –50) ± 20V</td></tr>
<tr><td></td><td>Photo</td><td>–245 + (Memo sheet No. 39 set value –50) ± 20V</td></tr>
<tr><td>Black-and-white</td><td>Graphic</td><td>–485 + (Memo sheet No. 49 set value –50) ± 20V</td></tr>
<tr><td></td><td>Photo</td><td>–295 + (Memo sheet No. 50 set value –50) ± 20V</td></tr>
</table></td><td>Setting value</td><td>57/9</td><td>Digital multimeter</td><td>9-15</td><td></td></tr>
<tr><td></td><td>C-3</td><td>PC belt cleaner drive solenoid stroke adjustment<br>(Adjust by changing the solenoid stroke adjusting plate mounting position.)</td><td></td><td>Solenoid stroke adjusting plate</td><td></td><td>• Thickness gauge</td><td>9-18</td><td>Go to C-4.</td></tr>
<tr><td></td><td>C-4</td><td>PC belt cleaner main blade position adjustment<br>(Adjust by changing the mounting positions of blade mounting plates F and R.)</td><td></td><td>Position of blade mounting plates F and R</td><td></td><td>Slide calipers</td><td>9-18</td><td>Go to (43).</td></tr>
<tr><td></td><td>C-5</td><td>PC belt cleaner sub blade position adjustment<br>(Adjust by changing the mounting position of the blade mounting plate.)</td><td></td><td>Position of blade mounting plate</td><td></td><td>Slide calipers</td><td>9-18</td><td>Go to (43).</td></tr>
</table>

| Section | Item No. | Description | Spec | Adjustment | Test command No. | Tool | Ref page | Next required pocedures |
|---|---|---|---|---|---|---|---|---|
| [Developer section] | D-1 | Automatic toner concentration sensor sense level adjustment (Y, M, C)<br>(Use test command 25 mode 1 to store the toner concentration sensor level in the developer unit.) |  | Set value | 25-1 |  | 3-13 | Go to D-9/E-2. |
|  | D-2 | Automatic toner concentration sensor sense level adjustment (BK)<br>(Use test command 25 mode 1 to store the toner concentration sensor level in the developer unit.) |  | Set value | 25-1 |  | 3-12 | Go to D-10/G-5/G-6/G-12. |
|  | D-3 | Developer bias voltage adjustment<br>(Use test command 8 and adjust with main PWB VR102/103/104.) | GR-mode – DC –100 ± 5V<br>PH-mode – DC –80 ± 5V<br>warm up mode – DC –60 ± 5V | Main PWB<br>VR102<br>VR103<br>VR104 | 8 | • Small minus screwdriver<br>• Digital multmeter | 11-17 |  |
|  | D-4 | Developer roller main pole position adjustment<br>(Adjust by changing the mounting position of the developer MG roller main pole position adjusting plate.) |  | Main pole position adjusting plate |  | • Scale<br>• String<br>• Needle | 11-14 | Go to D-5. |
|  | D-5 | Transport roller main pole position adjustment<br>(Adjust by changing the mounting position of the transport MG roller main pole position adjusting plate.) |  | Main pole position adjusting plate |  | • Scale<br>• String<br>• Needle | 11-15 | Go to D-6. |
|  | D-6 | Developer roller doctor clearance adjustment<br>(Adjust by changing the doctor mounting position.) | Color DV unit 1.5 ± 0.05mm<br>Black DV unit 2.0 ± 0.05mm | Doctor position |  | Thickness gauge | 11-13 |  |
|  | D-7 | Developer clutch clearance adjustment | 0.2 ± 0.05mm | Clutch boss |  | Thickness gauge | 11-16 |  |
|  | D-8 | Stirring clutch clearance adjustment. | 0.2 ± 0.05mm | Clutch boss |  | Thickness gauge | 11-16 |  |
|  | D-9 | Developer counter reset (Y, M, C)<br>(Use test command 42.) | 0 | Developer counter (Y, M, C) | 42 |  | 18-20 |  |
|  | D-10 | Developer counter reset (BK)<br>(Use test command 42.) | 0 | Developer counter (BK) | 42 |  | 18-20 |  |

| Section | Item No. | Description | Spec | | Adjustment | Test command No. | Tool | Ref page | Next required pocedures |
|---|---|---|---|---|---|---|---|---|---|
| [TX section] | E-1 | Gamma sensor output level adjustment<br>(Note: This adjustment should be made only when a new developer is installed.)<br>(Use test command 66 and adjust with gamma sensor PWB VR3.) | 70 ± 2 | | Gammar sensor PWB, VR3 | 66 | • Small minus scredriver | 10-19 | E-2 |
| | E-2 | Gamma reference level setting<br>(Note: This adjustment should be made only when new developer (Y, M, C) is installed. If the gamma reference level for aged developer is memorized, set the memorized value with test command 59.) | | | | 60 | | 3-16 | Go to G-1/G-2/G-3/G-4. |
| | E-3 | Primary TX roller voltage adjustment<br>Use test command 10 with TX roller high voltage PWB (BTHVG) VR A, B, C, and D. | TX voltage | Specified voltage | FRHVG | 10 | • Small minus screwdriver<br>• Digital multimeter | 10-13 | Go to (27)<br>Go to G5/G6/G10/G12 |
| | | | BTHV-A | DC −500 ± 10V | VR-1 | | | | |
| | | | BTHV-B | DC −600 ± 10V | VR-2 | | | | |
| | | | BTHV-C | DC −700 ± 10V | VR-3 | | | | |
| | | | BTHV-D | DC −900 ± 10V | VR-4 | | | | |
| | E-4 | TX belt cleaner drive solenoid stroke adjustment<br>(Adjust by changing the solenoid stroke adjusting plate mounting position.) | | | Solenoid stroke adjustment plute | | Slide calipers | 10-16 | |
| | E-5 | TX belt cleaner blade position adjustment<br>(Adjust by changing the mounting positions of blade mounting plates F and R.) | | | Position of blade mounting plates F and R | | • Slide culipers<br>• Thickness gauge | 10-16 | |
| | E6 | TB cleaning roller clutch clearance adjustment | 0.15 ± 0.05mm | | Pressure adjusting screw | | • Thickness gauge | 10-17 | Go to E7 |
| | E7 | TB cleaning roller pressure adjustment | | | Roller frame | | • Slide calipers | 10-17 | |

| Section | Item No. | Description | Spec | | | | | | Adjustment | Test command No. | Tool | Ref page | Next required pocedures |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [TX section] | F-1 | Secondary TX roller voltage adjustment<br>Use test command 11 with the secondary TX roller high voltage PWB (BTHVG) VR A, B, C, and D. | TX voltage | TX condition | | | | Specified voltage | SRHVG | 11 | • Small minus screwdriver<br>• High voltage meter | 10-14 | Go to G1 ~ G12 |
| | | | | TX speed | Used toner | TX paper | Copy mode | | | | | | |
| | | | PTHV-A | 184mm/sec | 2 or more kinds | Plain paper (Length in transport direction 216mm or (less) | Full color, Monochrome (R, G, B) | -DC1.6 ± 0.05KV | VR-A | | | | |
| | | | PTHV-B | 184mm/sec | 1 kind | Plain paper | Black-white, Monochrome (Y, M, C) | -DC1.4 ± 0.05KV | VR-B | | | | |
| | | | | 115mm/sec | 2 or more kinds | Plain paper (Length in transport direction 216mm or (more) | Full color Monochrome (R, G, B) | | | | | | |
| | | | PTHV-C | 60m/sec | No relationship | OHP film | All modes | -DC2.0 ± 0.05KV | VR-C | | | | |
| | F-2 | TX roller clutch clearance/position adjustment | 0.15 ± 0.05mm | | | | | | Clutch boss | | • Thickness sauge<br>• Hex wrench | 10-15 | |
| | F-3 | TX clutch | 0.15±0.05mm | | | | | | Clutch boss | | • Thickness sauge<br>• Hex wrench | | |
| [Copy quality adjustment | G-1 | Full color manual graphic mode copy quality adjustment | *1 | | | | | | Setting value | 46 | Gray scale | 4-4 | Go to G-7. |
| | G-2 | Full color manual photo mode copy quality adjustment | *3 | | | | | | Setting value | 46 | Gray scale | 4-5 | Go to G-11. |
| | G-3 | Monochrome manual graphic mode copy quality adjustment | *1 | | | | | | Setting value | 46 | Gray scale | 4-8 | Go to G-8. |
| | G-4 | Monochrome manual photo mode copy quality adjustment | *2 | | | | | | Setting value | 46 | Gray scale | 4-9 | Go to G-9. |
| | G-5 | Black-and-white manual graphic mode copy quality adjustment | *1 | | | | | | Setting value | 46 | Gray scale | 4-10 | Go to G-12. |
| | G-6 | Black-and-white manual photo mode copy quality adjustment | *2 | | | | | | Setting value | 46 | Gray scale | 4-10 | Go to G-10. |
| | G-7 | Full color preset auto photo mode copy quality adjustment | | | | | | | Setting value | 53 | Gray scale | 4-12 | |
| | G-8 | Monochrome preset auto graphic mode copy quality adjustment | | | | | | | Setting value | 53 | Gray scale | 4-15 | |
| | G-9 | Monochrome preset auto photo mode copy quality adjustment | | | | | | | Setting value | 53 | Gray scale | 4-15 | |
| | G-10 | Black-and-white preset auto photo mode copy quality adjustment | | | | | | | Setting value | 53 | Gray scale | 4-16 | |
| | G-11 | *Full color auto graphic mode copy quality adjustment* | Setting value 10 | | | | | | Setting value | 63 (52/55) | Gray scale | 4-17 | |

| Section | Item No. | Description | Spec | Adjustment | Test command No. | Tool | Ref page | Next required pocedures |
|---|---|---|---|---|---|---|---|---|
| [Copy quality adjustment | G-12 | Black-and-white auto graphic mode copy quality adjustment AE level is adjusted. | Gray scale strip 0.2(1) is not copied. Gray scale strip 0.3(2) is clearly copied ( ) KODAK Gray scale |  | 51<br>47 |  | 4-18 |  |
| [Others] | I-1 | DC power unit adjustment (Adjust with VR701, 702, 703.) |  | DC power supply unit |  | • Small minus screwdriver | 15-1 |  |
|  |  |  | 30 ± 1.5V | VR701 |  |  |  |  |
|  |  |  | 24 ± 1.0V | VR702 |  |  |  |  |
|  |  |  | 10 ± 0.5V | VR703 |  |  |  |  |

*1 Density level 1 Gray scale strip 0.3 (3) is not copied and strip 0.5 (4) is slightly copied.

Density level 5 Gray scale strip 0.1 (A) is not copied and strip 0.2 (1) is slightly copied.

*2 Density level 3 Gray scale strip 0.1 (1) is not copied and strip 0.2(2) is slightly copied.

*3 LD area (Gray scale strip 0.1(1) is not copied and scale strip 0.2 (2) is slightly copied.)
HD area (Gray scale strip 0.5(5) is not copied and scale strip 0.7 (6) is clearly copied.)
( ): KODAK gray scale

## 3. The Main PW B replacement Procedure

After recording the present counter value and the adjustment values, replace the main PWB with a new one.

1. Record the present counter value.
   - Press the RC (Recall Counter) key on the blind operation panel and the RC lamp will light up.
   - Press numeric keys to read each counter value. The relationship between numeric keys and the counters is shown in the table below:

| Numeric key | Counter |
|---|---|
| 2 | Full color page counter |
| 3 | Black-and-white page counter |
| 4 | RGB page counter |
| 5 | YMC page counter |
| 7 | Full color photo page counter |

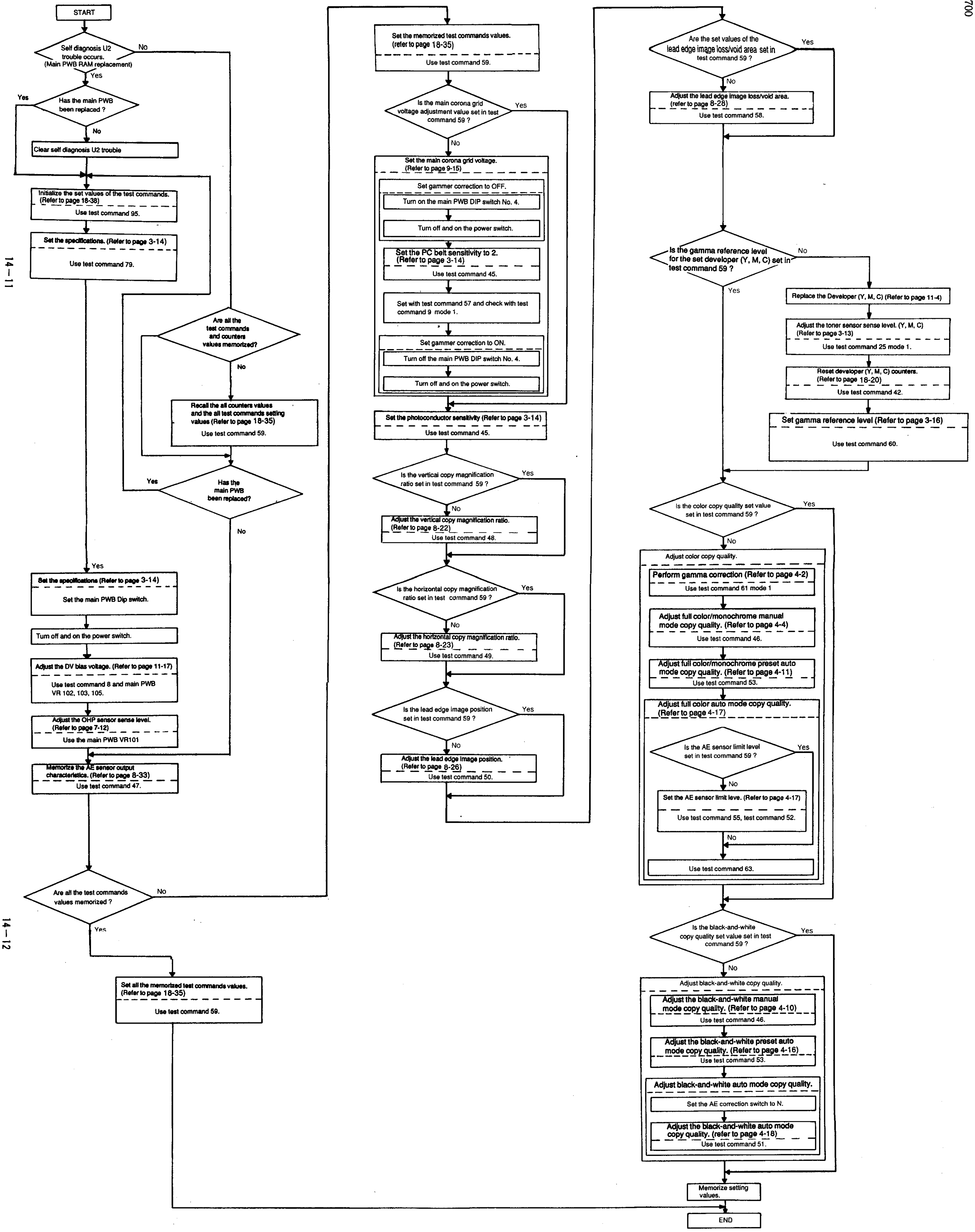
2. When the color balance memory (M1/M2 key) is in use, press the M1/M2 key and record each exposure/contrast setting. If the M1/M2 key is not in use, this procedure is not required.
3. Execute test command 19 to read the maintenance counter value.
   For execution of test command 19, refer to the Service Manual.
   Record the maintenance scan counter value and the maintenance page counter value.
4. Execute test command 41 to read the developer counter value.
   For execution of test command 41, refer to the Service Manual.
   Record the developer counters (Y, M, C, B) values.
5. Execute test command 59 to read each adjustment value.
   For execution of test command 59, refer to the Service Manual.
   Record all the adjustment values of the magnification ratio display from "00" to "73."
6. Replace the main PWB with the spare PWB. Use, however, the ROM without replacement. With the front cabinet open, turn on the power switch.
   - When "U2" is displayed, cancel U2.
   - Execute test command 95, referring to the Service Manual.
7. Execute test command 59 to enter the recorded adjustment values.

   When entering values with test command 59, be sure to push the color print switch after entering a value. If the color print switch is not pushed, the entered value is cancelled.
8. Execute test command 47 to measure the AE sensor characteristics.
   Since the adjustment values of test command 47 cannot be read or written by test command 59, test command 47 only must be executed again.
   For execution of test command 47, refer to the Service manual.
9. Adjust the bias adjusting VR (VR102, 103, 104) on the main PWB.
   For adjusting procedures, refer to the Service Manual.
10. Adjust the OHP sensor sensitivity adjusting VR on the main PWB. For the adjusting procedure, refer to the Service Manual.
11. When the color balance memory (M1/M2) is being used, enter the recorded set values.
12. After replacement of the main PWB, if the gammer correction is not performed in warming up or pre-rotation of copy, the gammer correction of the grid voltage remains 0. As a result, the copy density may be varied after the replacement of the main PWB. (Before replacement of the main PWB, the gammer correction is strong, and after the replacement it becomes 0.)
    Execute test command 61-1 to forcibly perform the gammer correction.
    - C → 0 → 0 → C → 6 → 1 → COLOR PRINT SW → 1 → COLOR PRINT SW

    The gamma correction is performed in warming up of the machine regardless of the fusing temperature.

    In some cases, however, e. g., when toner concentration is insufficient, the gamma correction may not be performed. If execution of test command 61 will not perform the gamma correction, then execute test command 61-1.

**Main PWB replacement**
**Main PWB RAM (IC144, 145) replacement**
**Clear self diagnosis U2 trouble**


START
Self diagnosis U2 trouble occurs. (Main PWB RAM replacement)
Yes
No
Has the main PWB been replaced ?
Yes
No
Clear self diagnosis U2 trouble
Initialize the set values of the test commands. (Refer to page 18-38)
Use test command 95.
Set the specifications. (Refer to page 3-14)
Use test command 79.
Are all the test commands and counters values memorized?
No
Recall the all counters values and the all test commands setting values (Refer to page 18-35)
Use test command 59.
Has the main PWB been replaced?
Yes
No
Yes
Set the specifications (Refer to page 3-14)
Set the main PWB Dip switch.
Turn off and on the power switch.
Adjust the DV bias voltage. (Refer to page 11-17)
Use test command 8 and main PWB VR 102, 103, 105.
Adjust the OHP sensor sense level. (Refer to page 7-12)
Use the main PWB VR101
Memorize the AE sensor output characteristics. (Refer to page 8-33)
Use test command 47.
Are all the test commands values memorized ?
No
Yes
Set all the memorized test commands values. (Refer to page 18-35)
Use test command 59.
Set the memorized test commands values. (refer to page 18-35)
Use test command 59.
Is the main corona grid voltage adjustment value set in test command 59 ?
Yes
No
Set the main corona grid voltage. (Refer to page 9-15)
Set gammer correction to OFF.
Turn on the main PWB DIP switch No. 4.
Turn off and on the power switch.
Set the PC belt sensitivity to 2. (Refer to page 3-14)
Use test command 45.
Set with test command 57 and check with test command 9 mode 1.
Set gammer correction to ON.
Turn off the main PWB DIP switch No. 4.
Turn off and on the power switch.
Set the photoconductor sensitivity (Refer to page 3-14)
Use test command 45.
Is the vertical copy magnification ratio set in test command 59 ?
Yes
No
Adjust the vertical copy magnification ratio. (Refer to page 8-22)
Use test command 48.
Is the horizontal copy magnification ratio set in test command 59 ?
Yes
No
Adjust the horizontal copy magnification ratio. (Refer to page 8-23)
Use test command 49.
Is the lead edge image position set in test command 59 ?
Yes
No
Adjust the lead edge image position. (Refer to page 8-26)
Use test command 50.
Are the set values of the lead edge image loss/void area set in test command 59 ?
Yes
No
Adjust the lead edge image loss/void area. (refer to page 8-28)
Use test command 58.
Is the gamma reference level for the set developer (Y, M, C) set in test command 59 ?
No
Yes
Replace the Developer (Y, M, C) (Refer to page 11-4)
Adjust the toner sensor sense level. (Y, M, C) (Refer to page 3-13)
Use test command 25 mode 1.
Reset developer (Y, M, C) counters. (Refer to page 18-20)
Use test command 42.
Set gamma reference level (Refer to page 3-16)
Use test command 60.
Is the color copy quality set value set in test command 59 ?
Yes
No
Adjust color copy quality.
Perform gamma correction (Refer to page 4-2)
Use test command 61 mode 1
Adjust full color/monochrome manual mode copy quality. (Refer to page 4-4)
Use test command 46.
Adjust full color/monochrome preset auto mode copy quality. (Refer to page 4-11)
Use test command 53.
Adjust full color auto mode copy quality. (Refer to page 4-17)
Is the AE sensor limit level set in test command 59 ?
Yes
No
Set the AE sensor limit leve. (Refer to page 4-17)
Use test command 55, test command 52.
No
Use test command 63.
Is the black-and-white copy quality set value set in test command 59 ?
Yes
No
Adjust black-and-white copy quality.
Adjust the black-and-white manual mode copy quality. (Refer to page 4-10)
Use test command 46.
Adjust the black-and-white preset auto mode copy quality. (Refer to page 4-16)
Use test command 53.
Adjust black-and-white auto mode copy quality.
Set the AE correction switch to N.
Adjust the black-and-white auto mode copy quality. (refer to page 4-18)
Use test command 51.
Memorize setting values.
END

# [15] OTHERS

## (1) DC power supply adjustments

### a. When the adjustment is required

- When the DC power supply unit is replaced.
- When any parts in the DC power supply unit are replaced.

### b. Tools required

- Digital multimeter
- Adjusting screwdriver

### c. Precautions

- Observe the following order to adjust, in order to attain the proper adjustment.
- Whenever a DC supply unit is serviced, all three DC power supply units need to be adjusted.
  (A change in the +30VDC affects VB (+24V) and VC (+10V).

① +30VDC power supply adjustment

② +24VDC power supply adjustment

### d. Adjustment procedure

① Open the clamshell and activate the front exterior switch (CSW).

② Turn the power on.

③ Measure on the digital multimeter the voltage across CNC-pin 2 (GND) and CN-D-pin 1 (+30V) of the DC power supply connector.

④ Adjust the +30VDC potentiometer (VR701) to obtain 30.0±0.5V.

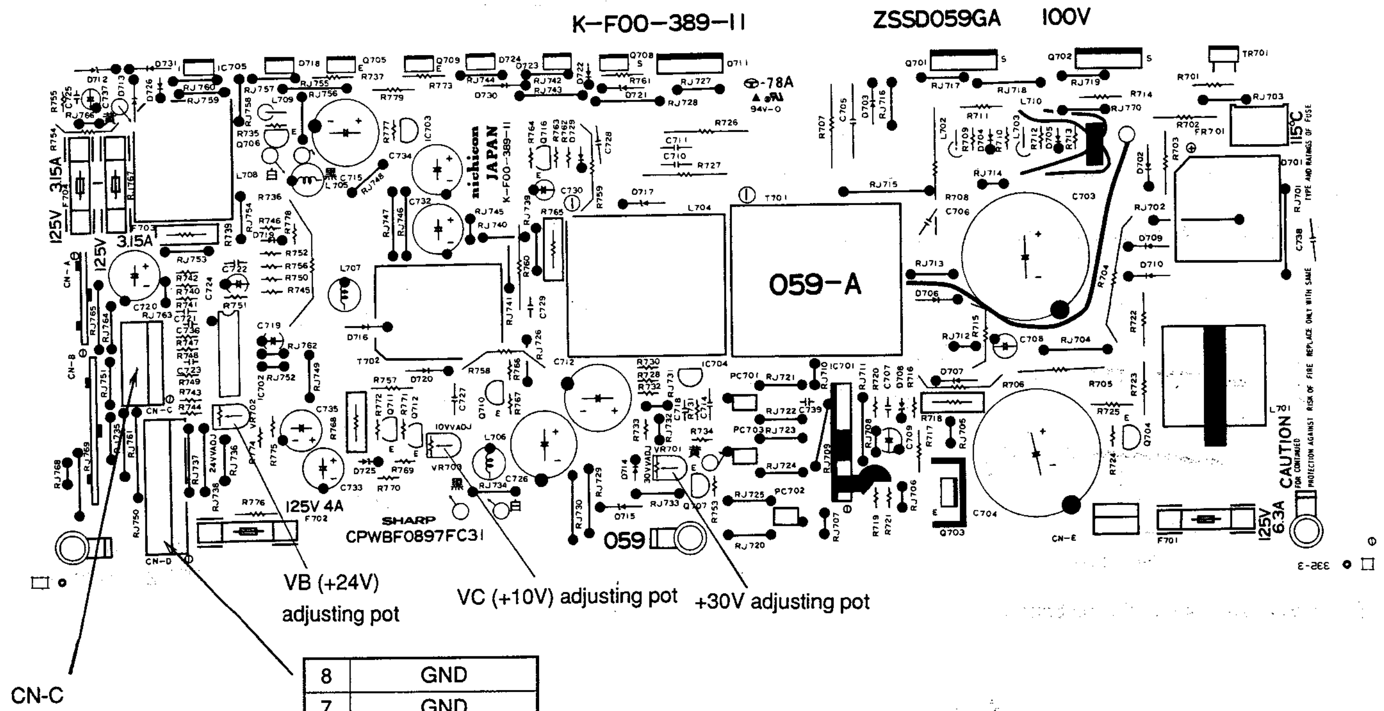
⑤ Measure on the digital multimeter the voltage across CN-C pin-2 (GND) and CN-D pin-3 (VB) of the DC power supply connector.

⑥ Adjust the +24VDC (VB) potentiometer (VR702) to obtain 24.0±0.5V.

⑦ Measure on the digital multimeter the voltage across CN-C pin-2 (GND) and CN-D pin-4 (VC) of the DC power supply connector.

⑧ Adjust the +10VDC (VC) potentiometer (VR703) to obtain 10.0±0.5V.

(The voltage increases when the potentiometer is turned clockwise and decreases when the potentiometer is turned counterclockwise.)



| | |
|---|---|
| 5 | +5V |
| 4 | VC (+10V) |
| 3 | GND |
| 2 | GND |
| 1 | VB (24V) |

| | |
|---|---|
| 8 | GND |
| 7 | GND |
| 6 | GND |
| 5 | +5V |
| 4 | VC (+10V) |
| 3 | VB (+24V) |
| 2 | +30V |
| 1 | +30V |

CND

## (2) Action against DC power unit problem

If DC power unit output voltages rise abnormally for some reason, the overvoltage protection is effected to stop supplying the outputs.
In this case, turn off the power switch and remove the problem. Then turn on the power switch to resume.
Be careful, however, it requires about 7 min from turning off to turning on the power switch to resume.

## (3) RAM backup battery replacement

### a. When replacement is required

- When the status "U1" (low battery) is displayed.

### b. Tools required

- Soldering pencil
- Solder
- Phillips tip screwdriver
- Battery (UBATL0004FCZZ)

### c. Precautions

- Do not place the main PWB on the table made of electrically conductive material.
- Never use battery of a different kind.

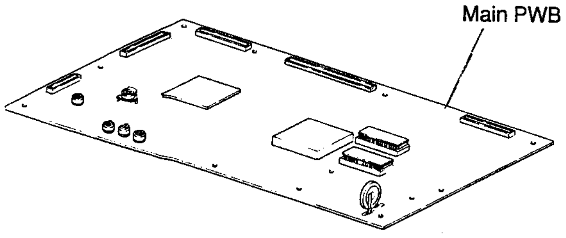
### d. Problems caused by improper procedure

- Memory contents destruction

### e. Replacement procedure

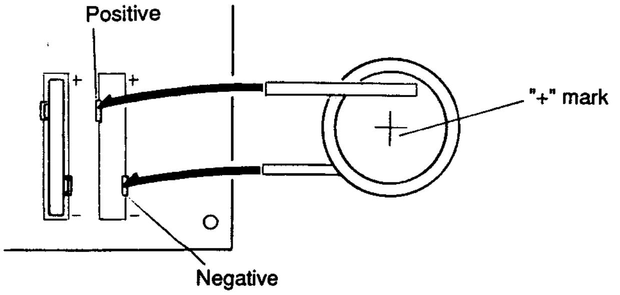
① Remove the main PWB.

② Remove the battery protect cover.

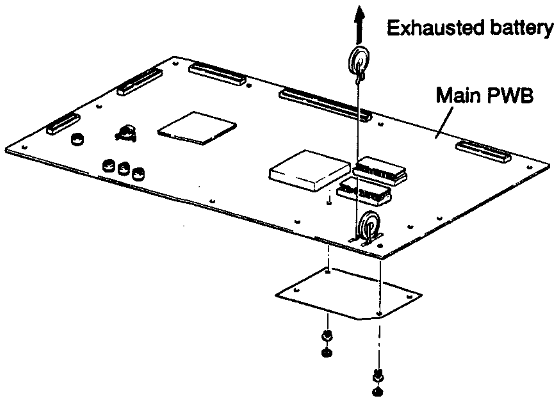


③ Install the fresh battery parallel to the current battery and attach it with solder.

IMPORTANT: Note proper connection of battery polarity.



④ Desolder and remove the old battery.



IMPORTANT: The new battery must be replaced within a short time after the machine displays the U1 status code.

⑤ Reinstall the main PWB.

⑥ Turn power on and perform test command 13.
C → 0 → 0 → C → 1 → 3 → COLOR PSW
(The status code "U1" is now cancelled.)

## (4) Ozone filter replacement

### a. When replacement is required

- At machine maintenance (120K copies)

### b. Tools required

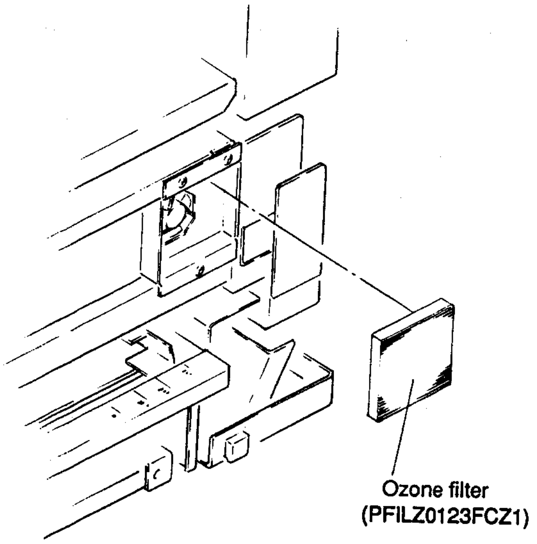
- Phillips tip screwdriver

### c. Replacement procedure

(Cooling fan ozone filter removal)

① Remove the right exterior.

② Remove the ozone filter from the exhaust fan unit and attach a new ozone filter.



# [16] Maintenance

There are two maintenance systems available.

(1) Scan counter maintenance based on the number of optical unit scans and PC belt rotations, and (2) Page counter maintenance based on the number of sheets of copy paper fed.

In the scan counter system, a full color graphic copy is counted as 3, a full color photo copy is as 6, a two- color copy as 2, and a single-color or a black-and-white copy as 1. Therefore the scan counter and the page counter differ from each other depending on the ratio of color copies. Maintenance is performed according to each counter.

Maintenance lamp:

When the scan counter reaches the maintenance level, the maintenance lamp lights up.
When the page counter reaches the maintenance level, the maintenance lamp blinks. (only with Main PWB Dip SW 8 set to "ON")

When the page counter and the scan counter reach the maintenance level at the same time, the maintenance lamp blinks.

If, however, dip switch 8 on the main PWB is set to OFF, only the scan counter condition is displayed.

The developer replacement frequency is indicated at 10K pages (10K scan) of color copies or 20K pages of black-and-white copies.

When any color developer lamp (Y, M, C) lights up, replace the color developer kit. When the black developer lamp lights up, replace the black developer.

In the case of full color photo mode copy, each color copy is counted as 2 scans (1 scan for LD, 1 scan for HD). Therefore the color developer must be replaced in 10K scans.

# 1. Maintenance table

## (1) Scan count maintenance (Replace/Clean/Lubricate)

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | | | Inst | Service call | Maintenance schedule (Unit: K (×1000)) | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 20/60 100/140 180/220 (Every 20K scan) | 40/80 160/200 (Every 40K scan) | 120/240 (Every 120K scan) | | | |
| Optical section | Mirror base A unit | | | | | | | ★ | | 8-8 | |
| | a | Copy lamp | Main | | × | ○ | ○ | ○ | | 8-8 | |
| | | | Sub | | × | ○ | ○ | ○ | | 8-8 | |
| | b | Reflector | Main | | × | ○ | ○ | ○ | | 8-8 | |
| | | | Sub | | × | ○ | ○ | ○ | | 8-8 | |
| | c | AE sensor | | | × | ○ | ○ | ○ | | 8-9 | |
| | d | CL lead harness | 100V series | | × | × | × | ▲ | | 8-9 | |
| | | | 200V series | | × | × | × | ▲ | | 8-9 | |
| | e | No. 1 mirror | | | × | ○ | ○ | ○ | | 8-10 | |
| | Mirror base B unit | | | | | | | | | 8-11 | |
| | a | No. 2 mirror | | | × | ○ | ○ | ○ | | 8-11 | |
| | b | No. 3 mirror | | | × | ○ | ○ | ○ | | 8-11 | |
| | No. 4 mirror | | | | × | ○ | ○ | ○ | | 8-11 | |
| | No. 5 mirror | | | | × | ○ | ○ | ○ | | 8-11 | |
| | Lens | | | | × | ○ | ○ | ○ | | 8-14 | Clean only with lens cleaning solution and lens cleaning cloth. |
| | Filters | | R | | × | ○ | ○ | ○ | | 8-17 | |
| | | | G | | | | | | | | |
| | | | B | | | | | | | | |
| | | | ND | | | | | | | | |
| | Screen | | | | ○ | ○ | ○ | ○ | | 8-19 | |
| | Original cover | | | | ○ | ○ | ○ | ○ | | | |
| | Original table | | | | ○ | ○ | ○ | ○ | | | |
| | Lens base slider | | | | × | × | ☆ | ☆ | | 8-15 | |

☆ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install
× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | | Inst | Service call | Maintenance schedule (Unit: K (×1000)) | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 20/60 100/140 180/220 (Every 20K scan) | 40/80 160/200 (Every 40K scan) | 120/240 | | | |
| Optical section | Mirror base slider | | | × | × | × | ☆ | | | |
| PC section | Main corona unit | | | | | | | | 9-4 | |
| | a | Corona wire | ○ | × | ○ | ▲ | ▲ | | 9-4 | |
| | b | Grid | ○ | × | ○ | ▲ | ▲ | | 9-4 | |
| | PC belt | | ▲ | × | × | ▲ | ▲ | | 9-5 | |
| | Pre-discharge lamp | | | ○ | ○ | ○ | ○ | | 10-12 | |
| | Discharge lamp unit | | | ○ | ○ | ○ | ○ | | 9-9 | |
| | Blank lamp unit | | | ○ | ○ | ○ | ○ | | 9-9 | |
| | a | Shield unit | | × | × | × | ▲ | | 9-10 | |
| | Toner receiver | | | × | ○ | ○ | ○ | | 9-10 | |
| | PC belt cleaner unit | | | ○ | ○ | ○ | ○ | | 9-10 | |
| | a | Main blade | ▲ | × | ▲ | ▲ | ▲ | | 9-10 | *1 |
| | b | Sub blade | ▲ | × | ▲ | ▲ | ▲ | | 9-10 | *1 |
| | c | Shield unit F | | × | ○ | ○ | ▲ | | 9-10 | |
| | d | Shield unit R | | × | ○ | ○ | ▲ | | 9-10 | |
| | e | Shield unit A | | × | ○ | ○ | ▲ | | 9-11 | |
| | f | Shield unit B | | × | ○ | ○ | ▲ | | 9-11 | |
| | g | Developer removing magnet | | × | ○ | ○ | ○ | ○ | 9-12 | |
| | PC belt drive unit | | | | | | | | 9-12 | |
| | a | Drive roller | | × | ○ | ○ | ○ | | 9-13 | |
| | b | Tension roller | | × | ○ | ○ | ○ | | 9-13 | |
| | c | Drive roller cleaner | | × | ▲ | ▲ | ▲ | | 9-13 | |
| | d | Pressure plate | | × | ○ | ○ | ○ | | 9-13 | |
| | PC belt home position sensor | | | × | ○ | ○ | ○ | | 9-14 | |
| | Toner collection bottle | | | × | ▲ | ▲ | ▲ | | | |
| | Waste toner full sensor | | | × | ○ | ○ | ○ | | 9-14 | |

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install
× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | | Inst | Service call | Maintenance schedule (Unit: K (×1000)) | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 20/60 100/140 180/220 (Every 20K scan) | 40/80 160/200 (Every 40K scan) | 120/240 | | | |
| TX section | TX belt | | | × | ▲ | ▲ | ▲ | | 10-4 | |
| | Primary TX roller | | | × | ○ | ○ | ○ | | 10-7 | |
| | Waste toner case | | | × | ○ | ○ | ○ | | 10-9 | |
| | TX belt cleaner unit | | | | | | | | 10-9 | |
| | a | Blade | ▲ | × | ▲ | ▲ | ▲ | | 10-9 | *1 |
| | b | Shield unit F | | × | × | × | ▲ | | 10-10 | |
| | c | Shield unit R | | × | × | × | ▲ | | 10-10 | |
| | d | Shield unit A | | × | × | × | ▲ | | 10-10 | |
| | e | Shield sheet | | × | × | × | ▲ | | 10-10 | |
| | f | TB cleaning roller | | × | × | × | × | | 10-11 | |
| | Waste toner full sensor | | | × | ○ | ○ | ○ | | 9-14 | |
| | TX belt drive unit | | | | | | | | 10-11 | |
| | a | Drive roller | | × | ○ | ○ | ○ | | 10-12 | |
| | b | Tension roller | | × | ○ | ○ | ○ | | 10-11 | |
| | c | Pressure roller | | × | ○ | ○ | ○ | | 10-11 | |
| | TX belt home position sensor | | | × | ○ | ○ | ○ | | 10-12 | |
| | Gamma sensor | | | ○ | ○ | ○ | ○ | | 10-12 | At Y, M, C developer replacement only cleaning |
| | Toner collection bottle | | | × | ▲ | ▲ | ▲ | | | |
| Developer/toner supply section | Shield unit F | | | × | ○ | ○ | ▲ | | 11-5 | |
| | Shield unit R | | | × | ○ | ○ | ▲ | | 11-5 | |
| | Shield felt FRa | | | × | ○ | ○ | ▲ | | 11-6 | |
| | Shield felt FRb | | | × | ○ | ○ | ▲ | | 11-6 | |
| | Shield felt A | | | × | ○ | ○ | ▲ | | 11-6 | |
| | Shield felt B | | | × | ○ | ○ | ▲ | | 11-6 | |

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | Inst | Service call | Maintenance schedule (Unit: K (×1000)) 20/60 100/140 180/220 (Every 20K scan) | 40/80 160/200 (Every 40K scan) | 120/240 | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|
| Developer/toner supply section | Shield sheet A |  | × | ○ | ○ | ▲ |  | 11-10 |  |
|  | Shield sheet B (Yellow DV unit only) |  | × | ○ | ○ | ▲ |  | 11-6 |  |
| Others | Gears |  | × | × | ★ | ★ |  |  |  |

**(Adjust)**

| Section | Item | Inst | Service call | Maintenance schedule (Unit: K (×1000)) 20/60 100/140 180/220 (Every 20K copies) | 40/80 160/200 (Every 40K copies) | 120/240 (Every 120K copies) | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|
|  | Copy quality adjustment | Δ | × | Δ | Δ | Δ |  | 4-1 |  |

## (2) Copy count maintenance (Replace/Clean/Lubricate)

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | | Inst | Service call | Maintenance schedule (Unit: K (× 1000)) | | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 10/30 50/70 90/110 130/150 170/190 210/230 (Every 10K copies | 20/60 100/140 180/220 (Every 20K copies | 40/80 160/200 (Every 40K copies | 120/240 (Every 120K copies | | | |
| Paper feed section | Upper cassette paper feed roller | | | × | ○ | ○ | ○ | ○ | | 7-8 | |
| | Lower cassette paper feed roller | | | × | ○ | ○ | ○ | ○ | | 7-9 | |
| | Upper transport roller | | | × | ○ | ○ | ○ | ○ | | 7-9 | |
| | Lower transport roller | | | × | ○ | ○ | ○ | ○ | | 7-10 | |
| | Manual paper feed roller | | | × | ○ | ○ | ○ | ○ | | 7-10 | |
| | Resist roller | | | × | ○ | ○ | ○ | ○ | | 7-10 | |
| | OHP sensor | Receiver | | × | ○ | ○ | ○ | ○ | | 7-8 | |
| | | Emitter | | | | | | | | | |
| TX section | Secondary TX roller unit | | | × | ○ | ○ | ○ | ○ | | 10-7 | |
| | a | Secondary TX roller | | × | ○ | ○ | ○ | ○ | | 10-7 | |
| | b | Blade | | × | ▲ | ▲ | ▲ | ▲ | | 10-8 | *2 |
| | c | Shield unit F | | × | × | × | × | ▲ | | 10-8 | |
| | d | Shield unit R | | × | × | × | × | ▲ | | 10-8 | |
| | e | Discharge unit | | ○ | ○ | ○ | ○ | ○ | | 10-8 | |
| | f | Waste toner case | | × | ○ | ○ | ○ | ○ | | 10-9 | |
| Paper transport section | Transport belt | | | × | ○ | ○ | ○ | ○ | | 12-1 | |
| | Paper separation detector | | | × | ○ | ○ | ○ | ○ | | 12-1 | |
| Fuser section | Upper heat roller | | | × | ▲ | ▲ | ▲ | ▲ | | 13-5 | |
| | Lower heat roller | | | × | ○ | ○ | ▲ | ▲ | | 13-5 | |
| | Fuser blade | | | × | ○ | ▲ | ▲ | ▲ | | 13-4 | *3 |

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

| Section | Part name | Inst | Service call | Maintenance schedule (Unit: K (× 1000)) | | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 10/30 50/70 90/110 130/150 170/190 210/230 (Every 10K copies | 20/60 100/140 180/220 (Every 20K copies | 40/80 160/200 (Every 40K copies | 120/240 (Every 120K copies | | | |
| Fuser section | Upper cleaner roller | | × | ○ | ▲ | ▲ | ▲ | | 13-6 | *3 |
| | Lower cleaner roller | | × | ○ | ▲ | ▲ | ▲ | | 13-6 | *3 |
| | Fuser oil | ▲ | × | ▲ | ▲ | ▲ | ▲ | | 13-4 | |
| | Used oil bottle | | | ▲ | ▲ | ▲ | ▲ | | 13-4 | |
| | Thermistor | | ○ | ○ | ○ | ○ | ○ | | 13-6 | |
| | Paper exit roller | | × | ○ | ○ | ○ | ○ | | | |
| Others | Ozone filter | | | × | × | × | ▲ | | 15-2 | |

**(Adjust)**

| Section | Item | Inst | Service call | Maintenance schedule (Unit: K (×1000)) | | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 10/30 50/70 90/110 130/150 170/190 210/230 (Every 10K copies) | 20/60 100/140 180/220 (Every 20K copies) | 40/80 160/200 (Every 40K copies) | 120/240 (Every 120K copies) | | | |
| Optical section | Uniformity adjustment | × | × | × | Δ | | ΔΔ | | 8-31 | |
| | AE sensor input level adjustment | Δ | × | × | Δ | Δ | Δ | | 8-32 | Perform after conformity adjustment. |
| | AE sensor limit level setting | Δ | × | × | Δ | Δ | Δ | | 8-34 | Perform after AE sensor input level adjustment. |
| | AE sensor output characteristics memory | Δ | × | × | Δ | Δ | Δ | | 8-33 | |

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

| Section | Item | Inst | Service call | Maintenance schedule (Unit: K (×1000)) | | | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 10/30<br>50/70<br>90/110<br>130/150<br>170/190<br>210/230<br>(Every 10K copies) | 20/60<br>100/140<br>180/220<br>(Every 20K copies) | 40/80<br>160/200<br>(Every 40K copies) | 120/240<br>(Every 120K copies) | | | |
| PC section | PC belt sensitivity setting | Δ | × | × | × | | ΔΔ | | 3-14 | |
| | Copy quality adjustment | Δ | × | Δ | Δ | Δ | Δ | | 4-1 | |

## (3) DV count maintenance (Replace)

| Section | Part name | Inst | Serivce call | Maintenance schedule (Unit: K (×1000)) | | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|
| | | | | 10/30<br>50/70<br>90/110<br>130/150<br>170/190<br>210/230<br>(Every 10K count) | 20/40<br>60/80<br>100/120<br>140/160<br>180/200<br>220/240<br>(Every 20K count | | | |
| | Color developer (Yellow, Magenta, Cyan) | | × | ▲ | ▲ | | 3-11<br>11-4 | Out of Y, M and C DV counter is over 10K<br>(DV lamp is ON) |
| | Black developer | | × | | ▲ | | 3-11<br>11-4 | BK DV counter is over 20K<br>(DV lamp is ON) |

Note: In the case of full color photo mode copy, each color copy is counted as 2 scans (1 scan for LD, 1 scan for HD). Therefore the color developer must be replaced in 10K scans.

★ = Lubricate ○ = Clean Δ = Adjust ▲ = Replace/install

× = Inspect (clean/replace/adjust as necessary)

**(Adjust)**

| Section | Item | | Inst | Service call | Maintenance schedule | Special tool | Ref page | Remark |
|---|---|---|---|---|---|---|---|---|
| Developer/toner supply sectio | Toner concentration sensor sense level (adjustment Y, M, C) | | Δ | | When new color developer (Y, M, C) is set. | | 3-13 | |
| | Toner concentration sensor sense level adjustment (BK) | | Δ | | When new BK developer is set. | | 3-12 | |
| | Copy quality adjustment | Color | Δ | × | When new color developer is set. | | 4-1 | |
| | | Black | Δ | × | When new BK developer is set. | | 4-1 | |
| TX section | Gamma sensor output level adjustment | | Δ | | When new color developer (Y, M, C) is set. | | 10-19 | Perform after cleaning the gamma sensor. |
| | Gamma reference level setting | | Δ | | | | 3-16 | Perform after gamma sensor output level adjustment. |

| | | |
|---|---|---|
| *1 Cleaner blade kit | PC belt cleaner blade | ×2 |
| | TX belt cleaner blade | ×1 |
| | Vinyl bag | ×1 |
| *3 Cleaner roller kit | Upper cleaner roller | ×1 |
| | Lower cleaner roller | ×1 |
| | Fuser blade | ×1 |
| *2 Secondary TX roller cleaner blade kit | Cleaner blade for secondary transfer roller | ×1 |
| | Vinyl bag | ×1 |

- Copy quality adjustment must be performed at every scan maintenance/copy maintenance/developer maintenance.

## 2. Tools necessary for maintenance

| | |
|---|---|
| • Tools: | Screwdrivers, pliers, hex wrench, C-ring pliers, tweezers, |
| • Cleaning liquid: | Alcohol, neutral cleanser, lens cleaning solution/cloths |
| • Grease: | Molycoat (BR2) grease (UKOG-0062FCZZ) white<br>Molycoat (UKOG-0158FCZZ) |
| • Oil | Machine oil |

- Cloth
- Vacuum cleaner
- Digital multimeter

## 3. Counter clearing and checking

After maintenance, clear each counter and check it as shown below:

| | Counter clearing/checking | Counter value | When required | Test command |
|---|---|---|---|---|
| 1 | Copy/scan maintenance preset counter checking | Scan: 20000<br>Copy: 10000 | At maintenance | 16 |
| 2 | Copy/scan maintenance counter checking | Quantity indicated | | 19 |
| 3 | Copy/scan maintenance counter clearing | Quantity indicated | | 20 |
| 4 | Developer counter clearing | Quantity indicated | | 42 |
| 5 | Developer counter checking | Quantity indicated | | 41 |
| 6 | Developer preset counter checking | Y, M, C: 10000<br>BK: 20000 | When developer is replaced. | 40 |

## 4. Maintenance preset counter setting (Option to field service)

Test command 72 could select Mini-PM time.

| | Scan counter PM preset | | Copy counter PM preset | |
|---|---|---|---|---|
| 72 | Set No. | PM indicator | Set No. | PM indicator |
| | 0 | 20k | 0 | 10k |
| | 1 | 5k | | |
| | 2 | 10k | 1 | 5k |
| | 3 | 15k | 2 | 15k |
| | 4 | 30k | 3 | 20k |
| | 5 | 40k | | |

## 5. Counter recall

For counter recall, use the counter recall key and numeric keys.

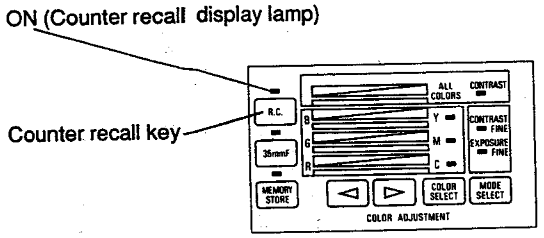
### (1) Counter recall procedure

① Depress the counter recall key.

- The counter recall display lamp lights.

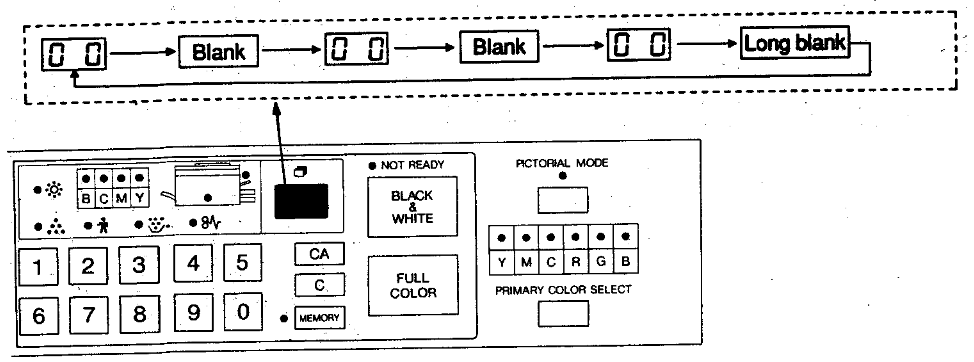
ON (Counter recall display lamp)

Counter recall key


ALL COLORS
CONTRAST
R.C.
B
G
R
Y
M
C
CONTRAST FINE
EXPOSURE FINE
MEMORY STORE
COLOR SELECT
MODE SELECT
COLOR ADJUSTMENT

② Depress numeric key corresponding to the counter to be recalled.

- During the numeric key is depressed, the counter content is displayed on the copy quantity indicator.
- The counter content is displayed by 2 digits (x 3 times) on the copy quantity display.


0 0
Blank
0 0
Blank
0 0
Long blank
B C M Y
NOT READY
BLACK & WHITE
FULL COLOR
PICTORIAL MODE
Y M C R G B
PRIMARY COLOR SELECT
1 2 3 4 5
6 7 8 9 0
CA
C
MEMORY

**Displayed counter and numeric key**

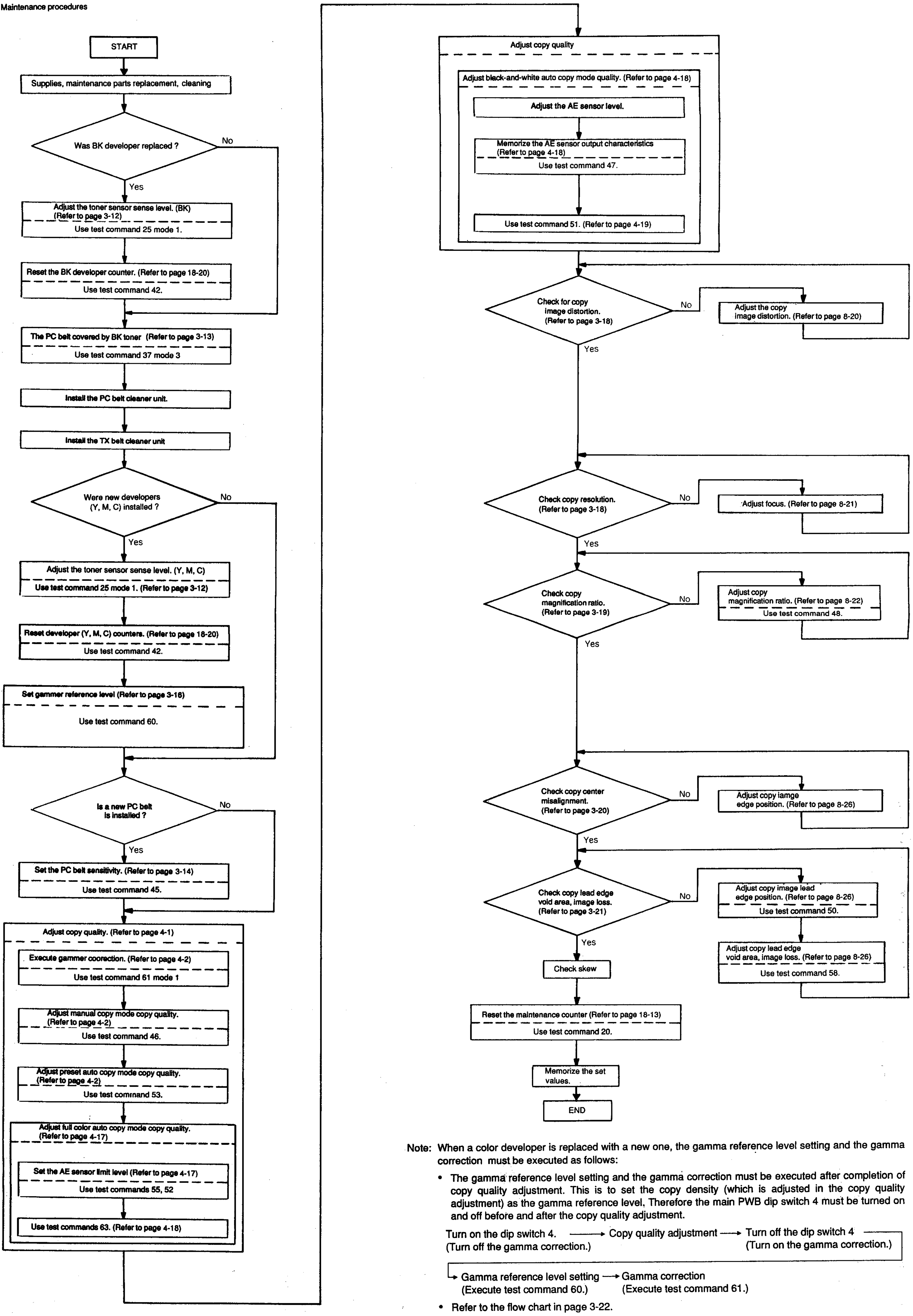
| Counter | Numeric key |
|---|---|
| Total scan counter | 0 |
| Total copy counter | 1 |
| Full color copy counter | 2 |
| Black-and-white copy counter | 3 |
| Monochrome (R,G,B) copy counter | 4 |
| Monochrome (Y,M,C) copy counter | 5 |
| Monochrome (R,G,B,Y,M,C) total copy counter | 6 |
| Full color copy counter (Photo mode) | 7 |

**Copy mode and scan count number**

| Copy mode | Paper size | Counter number (per copy) | |
|---|---|---|---|
| | | When main PWB DIP SW No. 3 is ON: | When main PWB DIP SW No. 3 is OFF: |
| Full color | A4 (5-1/2 x 8-1/2") | 3 | 3 |
| | A3 (11 x 17") | 6 | 3 |
| Full color Photo mode) | A4 (5-1/2 x 8-1/2") | 6 | 6 |
| | A3 (11 x 17") | 12 | 6 |
| Black-and-white, | A4 (5-1/2 x 8-1/2") | 1 | 1 |
| Monochrome (Y,M,C) | A3 (11 x 17") | 2 | 1 |
| Monochrome (R,G,B) | A4 (5-1/2 x 8-1/2") | 2 | 2 |
| | A3 (11 x 17") | 4 | 2 |

### (2) Counter recall mode cancel

To cancel counter recall mode, depress the counter recall key or CA (clear-all) key. (The counter recall display lamp will go out.)


START
Supplies, maintenance parts replacement, cleaning
Was BK developer replaced ?
No
Yes
Adjust the toner sensor sense level. (BK) (Refer to page 3-12)
Use test command 25 mode 1.
Reset the BK developer counter. (Refer to page 18-20)
Use test command 42.
The PC belt covered by BK toner (Refer to page 3-13)
Use test command 37 mode 3
Install the PC belt cleaner unit.
Install the TX belt cleaner unit
Were new developers (Y, M, C) installed ?
No
Yes
Adjust the toner sensor sense level. (Y, M, C)
Use test command 25 mode 1. (Refer to page 3-12)
Reset developer (Y, M, C) counters. (Refer to page 18-20)
Use test command 42.
Set gammer reference level (Refer to page 3-16)
Use test command 60.
Is a new PC belt is installed ?
No
Yes
Set the PC belt sensitivity. (Refer to page 3-14)
Use test command 45.
Adjust copy quality. (Refer to page 4-1)
Execute gammer coorection. (Refer to page 4-2)
Use test command 61 mode 1
Adjust manual copy mode copy quality. (Refer to page 4-2)
Use test command 46.
Adjust preset auto copy mode copy quality. (Refer to page 4-2)
Use test command 53.
Adjust full color auto copy mode copy quality. (Refer to page 4-17)
Set the AE sensor limit level (Refer to page 4-17)
Use test commands 55, 52
Use test commands 63. (Refer to page 4-18)
Adjust copy quality
Adjust black-and-white auto copy mode quality. (Refer to page 4-18)
Adjust the AE sensor level.
Memorize the AE sensor output characteristics (Refer to page 4-18)
Use test command 47.
Use test command 51. (Refer to page 4-19)
Check for copy image distortion. (Refer to page 3-18)
No
Adjust the copy image distortion. (Refer to page 8-20)
Yes
Check copy resolution. (Refer to page 3-18)
No
Adjust focus. (Refer to page 8-21)
Yes
Check copy magnification ratio. (Refer to page 3-19)
No
Adjust copy magnification ratio. (Refer to page 8-22)
Use test command 48.
Yes
Check copy center misalignment. (Refer to page 3-20)
No
Adjust copy iamge edge position. (Refer to page 8-26)
Yes
Check copy lead edge void area, image loss. (Refer to page 3-21)
No
Adjust copy image lead edge position. (Refer to page 8-26)
Use test command 50.
Adjust copy lead edge void area, image loss. (Refer to page 8-26)
Use test command 58.
Yes
Check skew
Reset the maintenance counter (Refer to page 18-13)
Use test command 20.
Memorize the set values.
END

Note: When a color developer is replaced with a new one, the gamma reference level setting and the gamma correction must be executed as follows:

- The gamma reference level setting and the gamma correction must be executed after completion of copy quality adjustment. This is to set the copy density (which is adjusted in the copy quality adjustment) as the gamma reference level. Therefore the main PWB dip switch 4 must be turned on and off before and after the copy quality adjustment.

Turn on the dip switch 4. ⟶ Copy quality adjustment ⟶ Turn off the dip switch 4
(Turn off the gamma correction.) (Turn on the gamma correction.)

↳ Gamma reference level setting ⟶ Gamma correction
(Execute test command 60.) (Execute test command 61.)

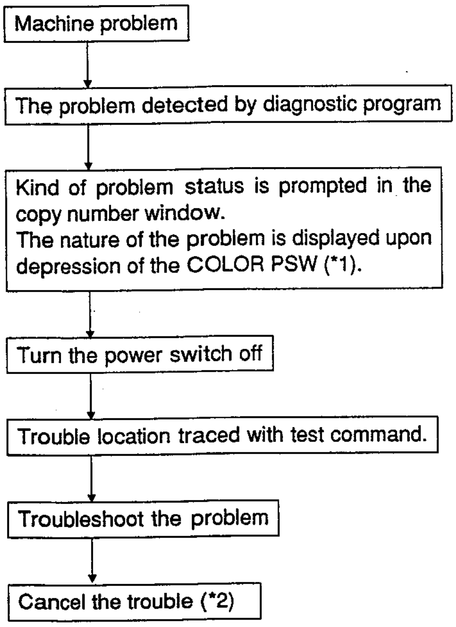
- Refer to the flow chart in page 3-22.

# [17] DIAGNOSTICS

## 1. General

Diagnostics are provided to do the following:

- With this function the machine detects a machine malfuntion and prompts its cause in the copy number window to alert the operator or customer engineer of machine problem.
- Upon the occurrence of the machine error, power supplied to AC machine blocks is shut off automatically to hold a machine damage to a minimum.


Machine problem
The problem detected by diagnostic program
Kind of problem status is prompted in the copy number window.
The nature of the problem is displayed upon depression of the COLOR PSW (*1).
Turn the power switch off
Trouble location traced with test command.
Troubleshoot the problem
Cancel the trouble (*2)

Clear the status message in the copy number window.

(*1): Kinds of problem provided with substatus
E1~E4, L4, U3, U, GA, rP.

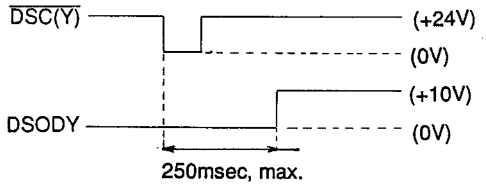
(*2): Cancel the trouble
You can cancel the problem status according to the procedure given below for a different cancellation method may be required depending on a kind of problem and location.

| Problem status | Cancel operation |
|---|---|
| E1~E4, F5, H2, L1, L3, L4, L6, L5, U3, U, GA, rP | Turn the power switch off, then on. |
| U1 | Execute the test command 13. |
| H3, H4 | Execute the test command 14. |
| CH, blinking CH, PC, CP | The status is cancelled at the moment the problem cause is eliminated. |

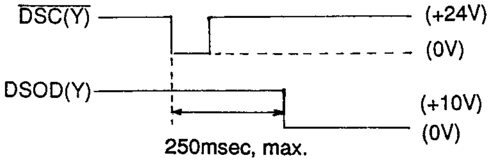
## 2. Listing of trouble status

| Problem status | Description | Ref. page |
|---|---|---|
| E1 | Yellow developer cartridge shutter problem. | 17-2 |
| E2 | Magenta developer cartridge shutter problem. | 17-4 |
| E3 | Cyan developer cartridge shutter problem. | 17-6 |
| E4 | Black developer cartridge shutter problem. | 17-8 |
| EE | Abnormal sensor level input is detected when adjusting the automatic toner concentration sensor level with test command 25. | 17-10 |
| EL | Abnormal sensor level input (over-toner) is detected when reading the sensor level with test command 25. | 17-11 |
| EU | Abnormal sensor level input (under-toner) is detected when reading the sensor level with test command 25. | 17-12 |
| F5 | Filter initial operational problem. | 17-13 |
| H2 | Open fuser thermistor circuit problem. | 17-14 |
| H4 | Abnormally low fuser temperature problem. | 17-15 |
| H3 | Abnormally high fuser temperature problem. | 17-16 |
| L1 | Mirror base forward movement problem. | 17-17 |
| L3 | Mirror base return movement problem. | 17-18 |
| L4 | PC motor, transfer motor, or PF motor problem. | 17-19 |
| L5 | Lens initial operation problem. | 17-27 |
| L6 | Problem in screen operation | 17-28 |
| U1 | Low memory backup battery power. | 17-29 |
| U2 | Memory data problem. | 17-30 |
| U3 | Data transfer problem between the main PWB and the slave PWB, if the problem was detected by the main PWB.<br>Or, an abnormal data is discovered when checking the AE sensor output characteristics with the test command 47. | 17-31 |
| U | Data transfer problem between the main PWB and the slave PWB, if the problem was detected by the slave PWB. | 17-33 |
| GA | Abnormal data is discovered when setting the gamma sensor base level with the test command 60. | 17-34 |
| rP | Transfer roller problem. | 17-36 |
| Blinking CH | Uninstalled developer cartridge.<br>Or, a developer cartridge installation sensor problem. | 17-38 |
| PC | Uninstalled personal counter for the copier model with a personal counter option.<br>A personal counter installation sensor problem for the copier model with a personal counter option. | 17-39 |
| CP | Inactive key switch. | 17-40 |
| CH | Front exterior incompletely closed.<br>A front exterior close sensor problem. | 17-41 |

# 3. Description

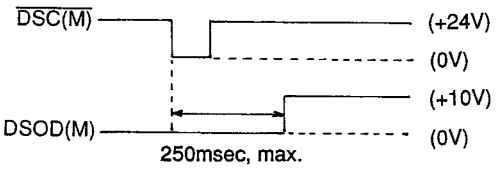
| Status | | Description |
|---|---|---|
| E1 | | ○ Yellow developer cartridge shutter problem |
| | Substatus | Description |
| | OP | ○ The developer cartridge shutter does not open.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was open. The developer cartridge shutter position detect signal DSOD(Y) (main PWB, IC112, pin 5) did not go high level (+10V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(Y)}}$ (main PWB, IC106, pin 14) turned low.<br> $\overline{\text{DSC(Y)}}$<br>(+24V)<br>(0V)<br>(+10V)<br>DSODY<br>(0V)<br>250msec, max. |
| | | Cause |
| | | • The developer cartridge shutter is locked owing to toner or developer clog.<br>• Failure in the developer cartridge shutter position detector or its signal input circuit.<br>• Failure in the MG roller clutch or its control circuit.<br>• Failure in the developer cartridge shutter clutch or its control circuit.<br>• Failure in the DV motor or its control circuit.<br>• Failure in a developer cartridge drive component. |
| | | Troubleshooting action |
| | | (1) Execute the test command 25, mode 1, or make a copy to check the following:<br>• Check the developer cartridge shutter position detector and its signal input circuit.<br>The developer cartridge shutter position detector is inactive when the shutter is open so that the detect signal DSODY (main PWB, IC112, pin 5) turns high (+10).<br>• Check the MG roller clutch and its control circuit.<br>The MG roller clutch turns active with a low state (0V) of the MG roller clutch drive signal $\overline{\text{DMGCY}}$ (main PWB, IC101, pin 14).<br>• Check the developer cartridge shutter clutch and its control circuit.<br>The developer cartridge shutter clutch turns on within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSCY}}$ (main PWB, IC106, pin 14) turned low level (0V).<br>The developer cartridge shutter opens and closes alternately each time the developer cartridge shutter clutch turns on.<br>• Check the DV motor and its control circuit.<br>The DV motor turns on with a low state (0V) of the DV motor drive SSR control signal $\overline{\text{DVM}}$.<br>• Check the developer cartridge shutter.<br>• Check the following developer block drive mechanism components.<br>☆ Drive belt<br>☆ Pulley<br>☆ Gearwheels<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Developer unit<br>• DV motor<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59. |

| Status | Description |
|---|---|
| E1 | ○ Yellow developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| CL | ○ The developer cartridge shutter does not close.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was closed. The developer cartridge shutter position detect signal DSOD(Y) (main PWB, IC112, pin 5) did not go low level (0V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(Y)}}$ (main PWB, IC106, pin 14) turned low.<br> $\overline{\text{DSC(Y)}}$<br>(+24V)<br>(0V)<br>DSOD(Y)<br>(+10V)<br>(0V)<br>250msec, max. |
| | Cause<br>• Same as the developer cartridge shutter open problem.<br>Note: This trouble status occurs also when the CX-7500 developer unit is erroneously installed. |
| | Troubleshooting action<br>• Same as the developer cartridge shutter open problem. |

| Status | Description |
|---|---|
| E2 | ○ Magenta developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| OP | ○ The developer cartridge shutter does not open.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was open. The developer cartridge shutter position detect signal DSOD(M) (main PWB, IC112, pin 6) did not go high level (+10V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(M)}}$ (main PWB, IC106, pin 15) turned low. |



**Cause**

- The developer cartridge shutter is locked.
- Failure in the developer cartridge shutter position detector or its signal input circuit.
- Failure in the MG roller clutch or its control circuit.
- Failure in the developer cartridge shutter clutch or its control circuit.
- Failure in the DV motor or its control circuit.
- Failure in a developer cartridge drive component.

**Troubleshooting action**

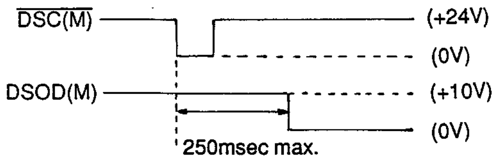
(1) Execute the test command 25, mode 1, or make a copy to check the following:
- Check the developer cartridge shutter position detector and its signal input circuit.
  The developer cartridge shutter position detector is inactive when the shutter is open so that the detect signal DSODM (main PWB, IC112, pin 6) turns high (+10).
- Check the MG roller clutch and its control circuit.
  The MG roller clutch turns active with a low state (0V) of the MG roller clutch drive signal $\overline{\text{DMGC(M)}}$ (main PWB, IC101, pin 15).
- Check the developer cartridge shutter clutch and its control circuit.
  The developer cartridge shutter clutch turns on within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(M)}}$ (main PWB, IC106, pin 15) turned low level (0V).
  The developer cartridge shutter opens and closes alternately each time the developer cartridge shutter clutch turns on.
- Check the DV motor and its control circuit.
  The DV motor turns on with a low state (0V) of the DV motor drive SSR control signal $\overline{\text{DVM}}$.
- Check the following developer block drive mechanism components.
  - ☆ Drive belt
  - ☆ Pulley
  - ☆ Gearwheels

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
- Main PWB
- Developer unit
- DV motor

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.

| Status | Description |
|---|---|
| E2 | ○ Magenta developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| CL | ○ The developer cartridge shutter does not close.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was closed. The developer cartridge shutter position detect signal DSOD(M) (main PWB, IC112, pin 6) did not go low level (0V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(M)}}$ (main PWB, IC106, pin 15) turned low.<br> $\overline{\text{DSC(M)}}$<br>(+24V)<br>(0V)<br>DSOD(M)<br>(+10V)<br>(0V)<br>250msec max. |

**Cause**

- Same as the developer cartridge shutter open problem.

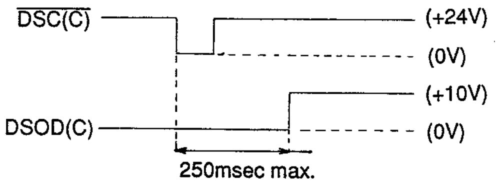
Note: This trouble status occurs also when the CX-7500 developer unit is erroneously installed.

**Troubleshooting action**

- Same as the developer cartridge shutter open problem.

| Status | Description |
|---|---|
| E3 | ○ Cyan developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| OP | ○ The developer cartridge shutter does not open.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was open. The developer cartridge shutter position detect signal DSOD(C) (main PWB, IC112, pin 7) did not go high level (+10V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(C)}}$ (main PWB, IC106, pin 16) turned low. |



**Cause**

- The developer cartridge shutter is locked.
- Failure in the developer cartridge shutter position detector or its signal input circuit.
- Failure in the MG roller clutch or its control circuit.
- Failure in the developer cartridge shutter clutch or its control circuit.
- Failure in the DV motor or its control circuit.
- Failure in a developer cartridge drive component.

**Troubleshooting action**

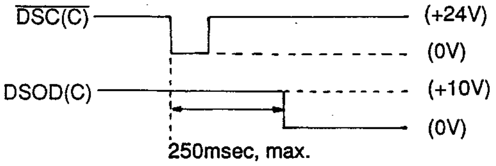
(1) Execute the test command 25, mode 1, or make a copy to check the following:
- Check the developer cartridge shutter position detector and its signal input circuit.
  The developer cartridge shutter position detector is inactive when the shutter is open so that the detect signal DSOD(C) (main PWB, IC112, pin 7) turns high (+10V).
- Check the MG roller clutch and its control circuit.
  The MG roller clutch turns active with a low state of the MG roller clutch drive signal $\overline{\text{DMGC(C)}}$ (main PWB, IC101, pin 16).
- Check the developer cartridge shutter clutch and its control circuit.
  The developer cartridge shutter clutch turns on within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(C)}}$ (main PWB, IC106, pin 16) turned low level (0V).
  The developer cartridge shutter opens and closes alternately each time the developer cartridge shutter clutch turns on.
- Check the DV motor and its control circuit.
  The DV motor turns on with a low state (0V) of the DV motor drive SSR control signal $\overline{\text{DVM}}$.
- Check the following developer block drive mechanism components.
  - ☆ Drive belt
  - ☆ Pulley
  - ☆ Gearwheels

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
- Main PWB
- Developer unit
- DV motor

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

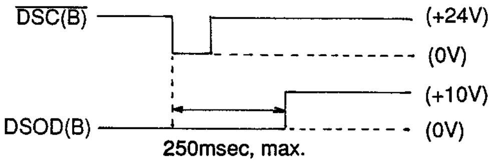
Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.

<table>
<tr><th>Status</th><th colspan="2">Description</th></tr>
<tr><td>E3</td><td colspan="2">○ Cyan developer cartridge shutter problem</td></tr>
<tr><td></td><td><b>Substatus</b></td><td><b>Description</b></td></tr>
<tr><td></td><td>CL</td><td>○ The developer cartridge shutter does not close.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was closed. The developer cartridge shutter position detect signal DSOD(C) (main PWB, IC112, pin 7) did not go low level (0V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(C)}}$ (main PWB, IC106, pin 16) turned low.</td></tr>
<tr><td></td><td></td><td><b>Cause</b><br>• Same as the developer cartridge shutter open problem.<br>Note: This trouble status occurs also when the CX-7500 developer unit is erroneously installed.</td></tr>
<tr><td></td><td></td><td><b>Troubleshooting action</b><br>• Same as the developer cartridge shutter open problem.</td></tr>
</table>



| Status | Description |
|---|---|
| E4 | ○ Black developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| OP | ○ The developer cartridge shutter does not open.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was open. The developer cartridge shutter position detect signal DSODB (main PWB, IC112, pin 4) did not go high level (+10V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSCB}}$ (main PWB, IC106, pin 13) turned low. |



**Cause**

- The developer cartridge shutter is locked.
- Failure in the developer cartridge shutter position detector or its signal input circuit.
- Failure in the MG roller clutch or its control circuit.
- Failure in the developer cartridge shutter clutch or its control circuit.
- Failure in the DV motor or its control circuit.
- Failure in a developer cartridge drive component.

**Troubleshooting action**

(1) Execute the test command 25, mode 1, or make a copy to check the following:

- Check the developer cartridge shutter position detector and its signal input circuit.
  The developer cartridge shutter position detector is inactive when the shutter is open so that the detect signal DSO(D) (main PWB, IC112, pin 4) turns high (+10).
- Check the MG roller clutch and its control circuit.
  The MG roller clutch turns active with a low state (0V) of the MG roller clutch drive signal $\overline{\text{DMGC(B)}}$ (main PWB, IC101, pin 13).
- Check the developer cartridge shutter clutch and its control circuit.
  The developer cartridge shutter clutch turns on within 250msec after the developer cartridge shutter clutch drive signal $\overline{\text{DSC(B)}}$ (main PWB, IC106, pin 13) turned low level (0V).
  The developer cartridge shutter opens and closes alternately each time the developer cartridge shutter clutch turns on.
- Check the DV motor and its control circuit.
  The DV motor turns on with a low state (0V) of the DV motor drive SSR control signal $\overline{\text{DVM}}$.
- Check the following developer block drive mechanism components.
  - ☆ Drive belt
  - ☆ Pulley
  - ☆ Gearwheels

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

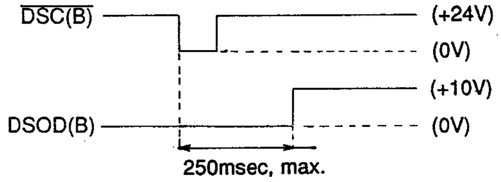
- Main PWB
- Developer unit
- DV motor

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.

| Status | Description |
|---|---|
| E4 | ○ Black developer cartridge shutter problem |

| Substatus | Description |
|---|---|
| CL | ○ The developer cartridge shutter does not close.<br>○ The developer cartridge open shutter sensor does not respond even if the developer cartridge shutter was closed. The developer cartridge shutter position detect signal DSOD(B) (main PWB, IC112, pin 4) did not go low level (0V) within 250msec after the developer cartridge shutter clutch drive signal $\overline{DSC(B)}$ (main PWB, IC106, pin 13) turned low. |



**Cause**

- Same as the developer cartridge shutter open problem.

Note: This trouble status occurs also when the CX-7500 developer unit is erroneously installed.

**Troubleshooting action**

- Same as the developer cartridge shutter open problem.

| Status | Description |
|---|---|
| EE | ○ Abnormal sensor level input is detected when adjusting the automatic toner concentration sensor level with test command 25. |

| Substatus | Description |
|---|---|
| None | ○ When performing test command 25, abnormal data is obtained. (The obtained data is extremely small or extremely great.)<br>When adjusting the automatic toner concentration sensor level, the toner sensor output is monitored while the developer unit is stirred, then the sensor is monitored 16 times furthermore after 2 min from starting stirring. The average value of the monitored values is stored in the backup memory as the toner concentration adjustment value. Since this value is abnormal (EL or EU is displayed), it is not stored in the memory. |

**Cause**

- Same as the cause of EL or EU.

**Troubleshooting action**

- Same as the troubleshooting of EL or EU.

| Status | Description |
|---|---|
| EL | ○ Abnormal sensor level input is detected when reading the sensor level with test command 25. |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| None | ○ When test command 25 is performed, the toner concentration sensor output falls below about 1.3V (out of the measurement range). (Over toner)<br>○ Normally the toner concentration sensor output is controlled within the range of 2.2±1V.<br>(When the toner concentration sensor output value is 2.2±1V, the sensor output level is displayed in the copy quantity display with the value from 0 to 99. | • Short circuit in the toner concentration sensor. | • Repair the trouble portion. (Replace the toner concentration sensor.) |

| Status | Description |
|---|---|
| EU | ○ Abnormal sensor level input is detected when reading the sensor level with test command 25. |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| None | ○ When test command 25 is performed, the toner concentration sensor output rises above about 3.2V (out of the measurement range). (Under-toner)<br>○ Normally the toner concentration sensor output is controlled within the range of 2.2±1V. (When the toner concentration sensor output value is 2.2±1V, the sensor output level is displayed in the copy quantity display with the value from 0 to 99.) | • The toner concentration sensor is open or the harness is open. | • Repair the trouble portion (Replace the toner concentration sensor or the harness.) |

| Status | Description |
|---|---|
| F5 | ○ Filter initial operation problem |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| None | ○ The filter fails to do initial operation.<br>○ The DN filter is not sensed by the filter home position sensor when the filter is set initialized.<br>○ The filter home position sensor output signal $\overline{FHPS}$ (slave PWB, IC208, pin 5) does not go low level (0V) within 2.5 seconds after the filter motor drive signal is issued when filter position is initialized. | • Failure in the filter motor or its control circuit.<br>• Failure in the filter home position sensor or its signal input circuit.<br>• Failure in a filter drive mechanism. | (1) Execute the test command 1 or 2 to check the following:<br>• Check the filter motor and its contron circuits.<br>The filter motor runs while the filter motor drive pulse signal $\overline{FMP0}$ ~ $\overline{FMP3}$ (slave PWB, IC205, pins 13~16) is issued.<br>The filter is set initialized within 2.5 seconds after the filter motor drive signal is issued.<br>• Check the filter home position sensor and its signal input circuit.<br>The ND filter must be ready on position when the filter is initialized at which time the filter home position sensor output signal $\overline{FHPS}$ (slave PWB, IC208, pin 5) is at a low level (0V).<br>• Check the following filter drive components.<br>☆ Filter drive belt<br>☆ Filter reset spring<br>☆ Filter rail<br>☆ Gearwheels<br>☆ Pulley<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Slave PWB<br>• Main PWB<br>• Filter motor<br>• Filter unit<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off. |

| Status | Description |
|---|---|
| H2 | ○ Open fuser thermistor problem |

| Substatus | Description |
|---|---|
| None | ○ The fuser thermistor is open.<br>○ The fuser temperature detect thermistor output signal TH (main PWB, IC146, pin 5) turned above 4.2V. |

**Cause**

- Failure in the fuser temperature detect circuit.
- Failure in the thermistor itself.

**Troubleshooting action**

(1) Execute the test command 6 to check the following:
  - Check the fuser temperature detect circuit.
    An H2 status is issued when the thermistor output signal TH (main PWB, IC146, pin 5) goes above 4.2V.
  - Check the thermistor is not open.
    The thermistor has a resistance of 50 to 200Kohms under a room temperature.

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
  - Main PWB
  - Fuser unit

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| H4 | ○ Abnormally low fuser temperature problem |

| Substatus | Description |
|---|---|
| None | ○ The temperature does not reach the given level of 180°C after a lapse of 10 minutes from the start of the warup (power relay turned active).<br>The fuser temperature detect thermistor output signal TH (main PWB, IC146, pin 5) does not reach 2.3V.<br>○ The temperature dropped to 70°C once after reaching the prescribed degree of 180°C.<br>The fuser temperature detect thermistor output signal TH (main PWB, IC146, pin 5) went above 3.7V. |
| | **Cause**<br>• Failure in the heater lamp drive circuit (the heater lamp does not turn on).<br>• Failure in the heater lamp.<br>• Failure in the fuser temperature detect circuit. |
| | **Troubleshooting action**<br>(1) Execute the test command 6 to check the following:<br>• Check the heater lamp drive circuit.<br>The heater lamp turns on with a low state (0V) of the heater lamp drive SSR control signal $\overline{HL1}$, $\overline{HL2}$.<br>If the heater lamp drive SSR keeps to be off, the temperature drops to evoke a problem status H4.<br>• Check the fuser temperature detect circuit.<br>The fuser temperature detect circuit thermistor output signal TH (main PWB, IC146, pin 5) is at 2.3V when the fuser is at the given temperature of 180C.<br>An H4 problem status is evoked when the fuser temperature detect circuit thermistor output signal TH (main PWB, IC146, pin 5) went above 3.7V.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Fuser unit<br>(3) Execute the test command 14 after the problemshoot was done.<br>The problem status turns off. |

| Status | Description |
|---|---|
| H3 | ○ Abnormally high fuser temperature problem |

| Substatus | Description |
|---|---|
| None | ○ The fuser temperature went above 215°C.<br>The fuser temperature detect circuit thermistor output signal TH (main PWB, IC146, pin 5) went below 1.4V.<br>**Cause**<br>• Failure in the heater lamp drive circuit (the heater lamp keeps to be on).<br>• Failure in the fuser temperature detect circuit.<br>**Troubleshooting action**<br>(1) Execute the test command 6 to check the following:<br>• Check the heater lamp drive circuit.<br>The heater lamp turns on with a low state (0V) of the heater lamp drive SSR control signal $\overline{HL1}$, $\overline{HL2}$.<br>If the heater lamp drive SSR keeps to be on, the temperature rises to evoke a problem status H3.<br>• Check the fuser temperature detect circuit.<br>The fuser temperature detect circuit thermistor output signal TH (main PWB, IC146, pin 5) is at 2.3V when the fuser is at the given temperature of 180C.<br>An H3 problem status is evoked when the fuser temperature detect circuit thermistor output signal TH (main PWB, IC146, pin 5) went below 1.4V.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Fuser unit<br>(3) Execute the test command 14 after the problemshoot was done.<br>The problem status turns off. |

| Status | Description |
|---|---|
| L1 | ○ Mirror base forward motion problem |

| Substatus | Description |
|---|---|
| None | ○ The mirror base home position sensor (MHPS1) fails to detect the mirror base during forward movement of the mirror base.<br>The mirror base home position sensor MHPS1 signal (main PWB, IC141, pin 6) is not at a low level (0V) when the mirror base is on its home position.<br>○ Both the mirror base home position sensor signals MHPS1 and MHPS2 do not detect the mirror base immediately after the mirror base starts to move forward.<br>Both the mirror base home position sensor signals MHPS1 (main PWB, IC141, pin 6) and MHPS2 (main PWB, IC141, pin 4) would not go low level (0V) at the same time immediately after the mirror base started to move forward.<br>○ The mirror base does not complete its forward movement within 4.5 seconds after the mirror base has started to move forward.<br>The mirror base scan pulse signals (SMRS1) are not counted appropriate to the copy mode within 4.5 seconds after the mirror base home position sensor signal MHPS1 (main PWB, IC141, pin 6) has turned from low (0V) to high (5V).<br>○ No mirror base scan signal $\overline{\text{SMRS1}}$ is not sent to the main PWB when the mirror base is moving forward.<br>The mirror base scan signal SMRS1 (main PWB, IC134, pin 24) kept high level (+5V) or low level (0V) continuously for 2.5ms when the mirror base is moving forward.<br>○ The mirror motor (MIRRM) revolutions are too high when the mirror base is moving forward.<br>The mirror scan sensor signal $\overline{\text{SMRS1}}$ (main PWB, IC134, pin 24) had a cycle of below 100 microseconds.<br>○ The mirror motor MIRRM does not run. |

**Cause**

- Failure in the mirror base home position sensor MHPS1 or its signal input circuit.
- Failure in the mirror motor MIRRM control circuit.
- Failure in the mirror scan sensor MSRS1 or its signal input circuit.
- Failure in the mirror motor MIRRM.
- Failure in a mirror base drive component.

**Troubleshooting action**

(1) Execute the test command 1 or 2 to check the following:

- Check the mirror base home position sensor MHPS1 and its signal input circuit.
  The mirror base home position sensor signal MHPS1 (main PWB, IC141, pin 6) and MHPS2 (main PWB, IC141, pin 4) are at a low level (0V) when the mirror base is on its home position.
  Immediaetly after the mirror base has started to move foward, the mirror base home position sensor signals MHPS2 (main PWB, IC141, pin 4) and MHPS1 (main PWB, IC141, pin 6) are at a high level (5V) for a certain period.
- Check the mirror motor MIRRM and its control circuit.
  The mirror motor MIRRM rotates with a low state (0V) of the mirror motor (MIRRM) on/off control signal $\overline{\text{MD}}$ (mirror motor control PWB, D603, anode) and an activate state of the mirror motor revolution control pulse signal $\overline{\text{SMRC}}$ (mirror motor control PWB, IC801, pins 2, 3, 4).
- The mirror motor revolutions increase when the low level (0V) duty of the mirror motor revolution control pulse signal $\overline{\text{SMRC}}$ (mirror motor control PWB, IC801, pins 2, 3, 4) is larger.
  The mirror motor rotates forward when the mirror motor direction control signal $\overline{\text{SMFR}}$ (mirror motor control PWB, IC802, pin 7) is at a low level (0V).
  The mirror motor power supply (VB) is about +30V.
- Check the mirror scan sensor SMRS1 and its signal input circuit.
  The mirror scan sensor pulse signal $\overline{\text{SMRS1}}$ is an input to the main PWB, IC135, pin 26, when the mirror is moving forward.
- Check the following mirror base drive components.
  - ☆ Mirror base drive wire
  - ☆ Pulley
  - ☆ Gearwheels

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB
- Mirror motor (MIRRM)
- Mirror motor control PWB
- Mirror base home position sensor (MHPS1)
- Mirror motor revolution sensor (SMRS1)

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| L3 | ○ Mirror base return movement problem |

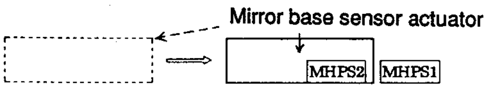
**Substatus**

None

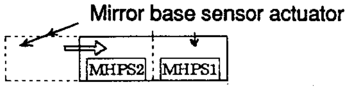
**Description**

○ The mirror base does not move to its home position within 1.5 seconds after the mirror base has started to return.
The mirror base home position sensor signal MHPS2 (main PWB, IC141, pin 4) does not turn low level (0V) within 1.5 seconds after the mirror base has started to return with a high state (+10V) of the mirror base moving direction select signal $\overline{SMF/R}$ (mirror motor control PWB, IC802, pin 7).

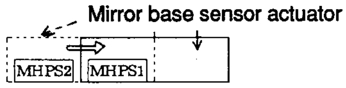
○ Of two mirror base home position sensors MHPS1 and MHPS2 in inactive state, the mirror base home position sensor MHPS2 fails to detect the mirror base when the mirror base is returning.
A high state (+5V) of the mirror home position sensor signal MHPS2 (main PWB, IC141, pin 4) does not change to a low level (0V) when the mirror base is returning.



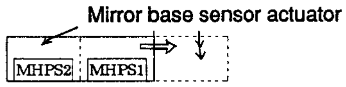
○ Of two mirror base home position sensors MHPS2 in active state and MHPS1 in inactive state, the MHPS1 does not change to an active state when the mirror base is returning.
A high state (+5V) of the mirror home position sensor signal MHPS1 (main PWB, IC141, pin 6) does not change to a low level (0V) when the mirror base is returning.



○ Of two mirror base home position sensors MHPS1 and MHPS2 in active state, the mirror base home position sensor MHPS2 fails to reset when the mirror base is returning.
A low state (0V) of the mirror home position sensor signal MHPS2 (main PWB, IC141, pin 4) does not change to a high level (5V) when the mirror base is returning.



○ Of two mirror base home position sensors MHPS2 in inactive state and MHPS1 in active state, the MHPS1 does not change to an inactive state when the mirror base is returning.
A low state (5V) of the mirror home position sensor signal MHPS1 (main PWB, IC141, pin 6) does not change to a high level (5V) when the mirror base is returning.



**Cause**

- Failure in the mirror base home position sensors MHPS1/MHPS2 or their input circuits.
- Failure in the mirror motor MIRRM control circuit.
- Failure in the mirror motor revolution sensor (SMRS1) or its signal input circuits.
- Failure in a mirror base drive component.
- Failure in the mirror motor.

**Troubleshooting action**

(1) Execute the test command 1 or 2 to check the following:

- Check the mirror base home position sensor MHPS1 or MHPS2 or its input circuirty.
  Both the mirror home position sensor signals MHPS1 (main PWB, IC141, pin 6) and MHPS2 (main PWB, IC141, pin 4) are at a low level (0V) when the mirror base is on its home position.
  The following states can be seen for the mirror base home position sensors MHPS1 and MHPS2 when the mirror base is returning.
- Check the mirror motor and its control circuit.
  The mirror motor (MIRRM) rotates with a low state of the mirror motor on/off control signal $\overline{MD}$ (mirror motor control PWB, CN-B, pin 5) and the mirror motor revolution control pulse signal $\overline{SMRC}$ (mirror motor control PWB, IC801, pins 2, 3, 4) are input.
  The mirror motor rotates in the backward direction when the mirror motor rotating direction control signal $\overline{SFR/R}$ (mirror motor control PWB, IC802, pin 7) is at a high level (+10V).
  The mirror motor supply voltage (VB) is +30V.
- Check the mirror motor scan sensor $\overline{SMRS1}$ or its input circuit.
  The mirror motor scan sensor (MSS1/MSS2) pulse signal SMRS1 is an input to the main PWB, IC134, pin 26, when the mirror motor is rotating.
- Check the following mirror base drive components.
  - ☆ Mirror base drive wire
  - ☆ Pulley
  - ☆ Gearwheels

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB
- Mirror motor (MIRRM)
- Mirror motor control PWB
- Mirror base home position sensors (MHPS1, MHPS2)
- Mirror motor (MIRRM) scan sensor (MSS1/MSS2)

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description |
|---|---|
| 1 | ○ The PC motor does not rotate.<br>○ The PC motor revolution sensor signal PBMRS fails to be sent to the main PWB, though the PC motor is rotating. The PC motor revolution sensor signal $\overline{\text{PBMRS}}$ is not received by the main PWB, IC134, pin 23, though the PC motor revolution control pulse signal PBMC1 is an input to the PC motor control PWB, IC801, pins 2, 3, 4, with the PC motor control signal $\overline{\text{MON}}$ (PC motor control PWB, D803, anode) at a low level (0V). |

**Cause**

- Failure in the PC motor control circuit.
- Failure in the PC motor revolution sensor or its input circuit.
- Failure in the PC motor itself.
- Failure in a PC belt drive component (lock).

**Troubleshooting action**

(1) Execute the test command 25, mode 2, to check the following:
- Check the PC motor control circuit.
  The PC motor rotates when the PC motor revolution control pulse signal $\overline{\text{PBMC1}}$ (PC motor control PWB, IC801, pins 2, 3, 4) is an input with a low state of the PC motor control on/off signal $\overline{\text{MON}}$ (PC motor control PWB, CN-B, pin 5).
  The PC motor revolution sensor signal $\overline{\text{PBMRS}}$ is an input to the main PWB, IC134, pin 23, when the PC motor is rotating.
  The PC motor power supply (VB) is +30V.

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
- Main PWB
- PC motor
- PC motor control PWB

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.
When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change.

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description |
|---|---|
| 2 | ○ Irregularly high PC motor revolutions.<br>The PC motor revolution sensor signal $\overline{\text{PBMRS}}$ (main PWB, IC134, pin 23) has a cycle below 0.3ms. |

**Cause**

- Failure in the PC motor control circuit.
- Failure in the PC motor revolution sensor or its input circuit.
- Failure in the PC motor itself.

**Troubleshooting action**

(1) Execute the test command 25, mode 2, to check the following:

- Check the PC motor control circuit.

  The PC motor rotates when the PC motor revolution control pulse signal $\overline{\text{PBMC1}}$ (PC motor control PWB, IC801, pins 2, 3, 4) is an input with a low state of the PC motor control on/off signal $\overline{\text{MON}}$ (PC motor control PWB, CN-B, pin 5).

  Higher the low level (0V) duty of the PC motor revolution control pulse signal $\overline{\text{PBMC1}}$ (PC motor control PWB, IC801, pins 2, 3, 4) is, the PC motor revolution becomes higher.

  The cycle of the PC motor revolution sensor $\overline{\text{PBMRS}}$ (main PWB, IC134, pin 23) is 0.5ms when the PC belt is moving at a speed of 184mm/sec with the PC motor in the forward motion.

  The PC motor power supply (VB) is +30V.

(2) Problemshoot the problem.

The unit below must be replaced depending on the cause.

- Main PWB
- PC motor
- PC motor control PWB

(3) Turn the power switch off and on after completion of problemshooting.

The problem status turns off.

Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.

When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change.

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description |
|---|---|
| 3 | ○ The transfer motor does not rotate.<br>○ The transfer motor revolution sensor signal TBMRS fails to be sent to the main PWB, though the transfer motor is rotating. The transfer motor revolution sensor signal $\overline{\text{TBMRS}}$ is not received by the main PWB, IC134, pin 22, though the transfer motor revolution control pulse signal TBMC1 is an input to the transfer motor control PWB, IC801, pins 2, 3, 4, with the transfer motor control signal $\overline{\text{MON}}$ (transfer motor control PWB, D803, anode) at a low level (0V). |

**Cause**

- Failure in the transfer motor control circuit.
- Failure in the transfer motor revolution sensor or its input circuit.
- Failure in the transfer motor itself.
- Failure in a PC belt drive component (lock).

**Troubleshooting action**

(1) Execute the test command 25, mode 2, to check the following:

- Check the transfer motor control circuit.
  The transfer motor rotates when the transfer motor revolution control pulse signal $\overline{\text{TBMC1}}$ (transfer motor control PWB, IC801, pins 2, 3, 4) is an input with a low state of the transfer motor control on/off signal $\overline{\text{MON}}$ (transfer motor control PWB, D803, anode).
  The transfer motor revolution sensor signal $\overline{\text{TBMRS}}$ is an input to the main PWB, IC134, pin 22, when the transfer motor is rotating.
  The transfer motor power supply (VB) is +30V.

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB
- Transfer motor
- Transfer motor control PWB

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.
When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change.

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| 4 | ○ Irregularly high transfer motor revolutions.<br>The transfer motor revolution sensor signal $\overline{\text{TBMRS}}$ (main PWB, IC134, pin 22) has a cycle below 0.3ms. | • Failure in the transfer motor control circuit.<br>• Failure in the transfer motor revolution sensor or its input circuit.<br>• Failure in the transfer motor itself. | (1) Execute the test command 25, mode 2, to check the following:<br>• Check the transfer motor control circuit.<br>The transfer motor rotates when the transfer motor revolution control pulse signal TBMC1 (transfer motor control PWB, IC801, pins 2, 3, 4) is an input with a low state of the transfer motor control on/off signal $\overline{\text{MON}}$ (PC motor control PWB, CD803, anode).<br>Higher the low level (0V) duty of the transfer motor revolution control pulse signal $\overline{\text{TBMC1}}$ (transfer motor control PWB, IC801, pins 2, 3, 4) is, the transfer motor revolution becomes higher.<br>The cycle of the transfer motor revolution sensor $\overline{\text{TBMRS}}$ (main PWB, IC134, pin 22) is 0.5ms when the TX belt is moving at a speed of 184mm/sec with the transfer motor in the forward motion.<br>The transfer motor power supply (VB) is +30V.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Transfer motor<br>• Transfer motor control PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.<br>When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change. |

<table>
<tr><th>Status</th><th colspan="2">Description</th></tr>
<tr><td rowspan="7">L4</td><td colspan="2">○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem</td></tr>
<tr><td>Substatus</td><td>Description</td></tr>
<tr><td rowspan="5">5</td><td>○ The PF motor does not rotate.<br>○ The PF motor revolution sensor signal PMRS fails to be sent to the main PWB, though the PF motor is rotating. The PF motor revolution sensor signal PMC1 is not received by the main PWB, IC134, pin 25, though the PF motor revolution control pulse signal $\overline{PMC1}$ is an input to the PF motor control PWB, IC901, pins 2, 3, 4, with the PF motor control signal $\overline{MON}$ (PF motor control PWB, D903, anode) at a low level (0V).</td></tr>
<tr><td>Cause</td></tr>
<tr><td>• Failure in the PF motor control circuit.<br>• Failure in the PF motor revolution sensor or its input circuit.<br>• Failure in the PF motor itself.<br>• Failure in a PC belt drive component (overload, lock).</td></tr>
<tr><td>Troubleshooting action</td></tr>
<tr><td>(1) Execute the test command 25, mode 2, to check the following:<br>• Check the PF motor control circuit.<br>The PF motor rotates when the PF motor revolution control pulse signal $\overline{PMC1}$ (PF motor control PWB, IC901, pins 2, 3, 4) is an input with a low state of the PF motor control on/off signal $\overline{MON}$ (PF motor control PWB, D903, anode).<br>The PF motor revolution sensor signal $\overline{PMRS}$ is an input to the main PWB, IC134, pin 25, when the PF motor is rotating.<br>The PF motor power supply (VB) is +30V.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• PF motor<br>• PF motor control PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.<br>When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change.</td></tr>
</table>

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description |
|---|---|
| 6 | ○ Irregularly high PF motor revolutions.<br>The PF motor revolution sensor signal $\overline{\text{PMRS}}$ (main PWB, IC134, pin 25) has a cycle below 0.5ms. |
| | **Cause**<br>• Failure in the PC motor control circuit.<br>• Failure in the PF motor revolution sensor or its input circuit.<br>• Failure in the PF motor itself. |
| | **Troubleshooting action**<br>(1) Execute the test command 25, mode 2, to check the following:<br>• Check the PF motor control circuit.<br>The PF motor rotates when the PF motor revolution control pulse signal $\overline{\text{PMC1}}$ (PF motor control PWB, IC901, pins 2, 3, 4) is an input with a low state of the PF motor control on/off signal $\overline{\text{MON}}$ (PF motor control PWB, CD803, anode).<br>Higher the low level (0V) duty of the PF motor revolution control pulse signal $\overline{\text{PMC1}}$ (PF motor control PWB, IC801, pins 2, 3, 4) is, the PF motor revolution becomes higher.<br>The cycle of the PF motor revolution sensor $\overline{\text{PMRS}}$ (main PWB, IC134, pin 25) is 0.65ms when the PA belt is moving at a normal speed.<br>The PF motor power supply (VB) is +30V.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• PF motor<br>• PF motor control PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.<br>When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change. |

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| 7 | ○ The PC belt home position sensor signal PBHP is not received by the main PWB or its pulse cycle is not within 3.2 to 5.34 seconds.<br>The PC belt home position sensor signal PBHP (main PWB, IC141, pin 10, IC130, pin 21) does not go high level (5V) even after couting 9000 to 15000 pulses of the PC motor revolutions sensor signal $\overline{\text{PBMRS}}$ (main PWB, IC134, pin 23) after the PC motor reached the given speed.<br>Even if the PC belt home position sensor signal PBHP is successfully inputted to the main PWB, its pulse cycle is not within 3.2 to 5.34 seconds (PC motor revolution sensor signal $\overline{\text{PBMRS}}$ (main PWB, IC134, pin 23) counted 9000 to 15000).<br>The pulse count of the PC motor revolution sensor signal $\overline{\text{PBMRS}}$ is reset each time a PC belt home position sensor signal PBHP is received by the main PWB.<br>○ The PC belt home positioner sensor signal PBHP pulse width is not within 3 to 24ms (12 to 42msec for the version C). | • A failure in the PC belt home position sensor (PBHPS) or its input circuit.<br>• A failure in the PC belt.<br>• A failure in the PC belt setting.<br>• A failure in a PC belt drive component. | (1) Execute the test command 25, mode 2, to check the following:<br>• Check the PC belt home position sensor (PBHPS) and its input circuit.<br>The PC belt home position sensor signal PBHP (main PWB, IC141, pin 10, IC130, pin 21) goes high level (+5V) when a PC belt home position is sensed by the PC belt home position sensor (PBHPS).<br>Its pulse width is within 3 to 24msec (21 to 42msec for the version C) and the cycle is 5.34 seconds (PC motor revolution sensor signal $\overline{\text{PBMRS}}$ (main PWB, IC134, pin 23) counts 15000 pulses).<br>The home position pulse width is checked by means of a timer.<br>• A failure in a PC belt drive component.<br>• Stained PC belt home position sensor light emitter or receiver.<br>• Stained or damaged PC belt home position mark.<br>• PC belt setting.<br>• Deformation in the PC belt.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.<br>When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change. |

| Status | Description |
|---|---|
| L4 | ○ PC motor problem<br>○ Transfer motor problem<br>○ PF motor problem |

| Substatus | Description |
|---|---|
| 8 | ○ The TX belt home position sensor signal TBHP is not received by the main PWB or its pulse cycle is not within 1.7 to 2.67 seconds.<br>The TX belt home position sensor signal TBHP (main PWB, IC141, pin 12, IC130, pin 22) does not go high level (5V) even after couting 4500 to 7000 pulses of the transfer motor revolutions sensor signal $\overline{\text{TBMRS}}$ (main PWB, IC134, pin 22) after the transfer motor reached the given speed.<br>Even if the TX belt home position sensor signal TBHP is successfully inputted to the main PWB, its pulse cycle is not within 1.7. to 2.67 seconds.<br>The pulse count of the transfer motor revolution sensor signal $\overline{\text{TBMRS}}$ is reset each time a TX belt home position sensor signal TBHP is received by the main PWB.<br>○ The TX belt home positioner sensor signal TBHP pulse width is not within 3 to 24ms (21 to 42msec for the version C). |
|  | **Cause** |
|  | • Failure in the TX belt home position sensor or its input circuit.<br>• Failure in the TX belt.<br>• Failure in the TX belt setting.<br>• Failure in a TX belt drive component. |
|  | **Troubleshooting action** |
|  | (1) Execute the test command 25, mode 2, to check the following:<br>• Check the TX belt home position sensor and its input circuit.<br>The TX belt home position sensor signal TBHP (main PWB, IC141, pin 12, IC130, pin 22) goes high level (+5V) when a TX belt home position is sensed by the TX belt home position sensor (TBHPS).<br>Its pulse width is within 3 to 24msec (21 to 42msec for the version C) and the cycle is 2.67 seconds (transfer motor revolution sensor signal TBMRS (main PWB, IC134, pin 22) counts 7000 pulses).<br>The home position pulse width is checked by means of a timer.<br>• A failure in a TX belt drive component.<br>• Stained TX belt home position sensor light emitter or receiver.<br>• Stained or damaged TX belt home position mark.<br>• TX belt setting.<br>• Deformation in the TX belt.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off.<br>Note: When checking the operation with test command 25, the toner density sensor level reference value may change. Therefore, the original value must be memorized in test command 59, and after operation check, if the reference value is changed, restore the value with test command 59.<br>When, however, test command 29 is executed with the developer removed, the toner density sensor level reference value in test command 25 will not change. |

| Status | Substatus | Description |
|---|---|---|
| L5 | | ○ Lens initial operation problem |
| | Substatus | **Description** |
| | None | ○ The lens does not initialize.<br>○ The lens home position sensor fails to detect the lens when initializing the lens.<br>The lens home position sensor signal LHPS (slave PWB, IC211, pin 22) does not turn high level (5V) within 8 seconds after the lens motor drive pulse signal $\overline{\text{LMP0}}$ ~ $\overline{\text{LMP3}}$ (slave PWB, IC213, pins 3, 5, 7, 9) has issued. |
| | | **Cause** |
| | | • Failure in the lens home position sensor (LHPS) or its input circuit.<br>• Failure in the lens motor control circuit.<br>• Failure in the lens motor itself.<br>• Failure in a lens base drive component. |
| | | **Troubleshooting action** |
| | | (1) Execute the test command 1 or 96 to check the following:<br>• Check the lens home position sensor and its input circuit.<br>The lens home position sensor signal LHPS (slave PWB, IC211, pin 22) turns high level (5V) when the lens is on its home position.<br>• Check the lens motor and its control circuit.<br>The lens motor rotates when the lens motor drive pulse signal $\overline{\text{LMP0}}$ ~ $\overline{\text{LMP3}}$ (slave PWB, IC213, pins 3, 5, 7, 9) has issued.<br>In 8 seconds after the lens motor drive pulse signal $\overline{\text{LMP0}}$~$\overline{\text{LMP3}}$ (slave PWB, IC213, pins 3, 5, 7, 9) has issued, the lens moves voer the copy magnificaition rate 64% position and the lens home position sensor output signal LHPS (mirror drive PWB, IC211, pin 22) turns high level (5V), when the lens is initialized.<br>The mirror motor power supply (VB) is +30V.<br>• Check the following lens base drive components.<br>☆ Lens base drive wire<br>☆ Pulley<br>☆ Gearwheels<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Lens motor<br>• Slave PWB<br>• Lens home position sensor<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off. |

| Status | Description |
|---|---|
| L6 | ○ Screen operation problem |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| None | ○ The screen is not reset.<br>(Within 1.5 sec after the screen motor drive signal $\overline{SMP0}$ ~ $\overline{SMP3}$ (Pulse signal) (Slave PWB IC202 pin14/pin13/pin15) are supplied, the screen home position sensor (SHPS) signal $\overline{SHPS}$ (slave PWB IC211, 13 pin) will not reach L level (0V).)<br>After copying, after the power switch is turned ON, or after the front exterior open/close detector is turned ON, the screen is reset.<br>(On starting copy operation in the photo copy mode, judgement is made if the screen is in reset state or not.)<br>When starting copy operation in the photo copy mode, the screen is in reset state.<br>• The screen is not set.<br>(Within 0.5 sec after the screen motor drive signal $\overline{SMP0}$ ~ $\overline{SMP3}$ (Pulse signal) (Slave PWB IC 202 pin16/pin14/pin13/pin15) are supplied, the screen home position sensor (SHPS) (Slave PWB IC211, 13 pin) will not reach L level (0V).)<br>Immediately after the copy operation is started in the photo copy mode, the screen is set. | • Problems in the screen motor and its control circuit<br>• Problems in the screen home position sensor and its control circuit<br>• Defective screen drive function | (1) Use test command 1 mode 3 to check the following:<br>• Check the screen motor and its control circuit.<br>(When screen motor drive signals $\overline{SMP0}$ ~ $\overline{SMP3}$ (pulse signals) (slave PWB IC202 13 ~ 16 pin) are supplied, the filter motor rotates.)<br>(The screen is reset within 1.5 sec after the screen motor drive signal is supplied.)<br>• Check the screen home position sensor and its input circuit.<br>(The screen is set within 0.5 sec after the screen motor drive signal is supplied. When the screen is at the home position, the screen home position sensor output signal $\overline{SHPS}$ (slave PWB IC211, 13 pin) is at L level (0V).)<br>• Check the following screen drive mechanism.<br>☆ Gear<br>☆ Setting spring<br>(3) After repairing, turn OFF and ON the power switch. (The problem display turns off.) |

| Status | Description |
|---|---|
| U1 | ○ Low memory backup battery power. |

| Substatus | Description |
|---|---|
| None | ○ The voltage of the memory backup battery dropped below 2.7V.<br>The memory voltage signal BCK-IN (main PWB, IC146, pin 2) turned below 2.6V.<br>The voltage of the analog switch output signal VO (main PWB, IC131, pin 7) turned below 2.3V, with the analog switch select signal AS0 (main PWB, IC146, pin 11) at a low level (0V), ASI (main PWB, IC146, pin 10) at a high level (5V), and AS2 (main PWB, IC146, pin 9) at a high level (5V).<br>(A diode is inserted between the battery and BCK-IN, and there is a voltage difference of about 0.1V there.) |

**Cause**

- Battery voltage drop.
- Failure in the battery voltage detect circuit.

**Troubleshooting action**

(1) Check the following:

- Check the battery voltage
  The battery is normal if the voltage across test pin BCK-IN and GND is above 2.7V.
- Check the battery voltage detect circuit.
  The battery voltage signal BCR-IN becomes the analog switch output signal VO and inputted to the main PWB, IC131, pin 7, with the analog switch select signal AS0 (main PWB, IC146, pin 11) at a low level (0V), ASI (main PWB, IC146, pin 10) at a high level (5V), and AS2 (main PWB, IC146, pin 9) at a high level (5V).
  A U1 problem status is caused if the voltage of the VO signal (main PWB, IC131, pin 7) turned below 2.6V.

(2) Problemshoot the problem.

a. If the problem owes to bttery voltage drop

① Turn the power switch off.
② Bind with solder a fresh battery parallel with the fatigued battery.
③ Remove the fatigued battery.

NOTES:
- Note polarity of battery.
- Do not short battery.
- Use the same type to replace with.
  If any one of above is disregarded, there is a possible explosion hazard.
- Do not remove the fatigued battery before the fresh battery is connected.
  If this is disregarded, proper operation may not be achieved because of a loss in the memory contents.
- Do the above steps ② and ③ quickly.
  The unit below must be replaced depending on the cause.
- Main PWB

NOTE: When the main PWB was replaced, the program data must be reloaded, in reference to 18-34 and 14-10.

(3) Do the test command 13 after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| U2 | ○ Memory data problem. |

| Substatus | Description |
|---|---|
| None | ○ The contents of the memory are affected (check sum error)<br>The data at power off does not match the data at power on again.<br>The total of all data at power off does not match the value at power on.<br>The total of all data at power off is stored in the memory. |

**Cause**

- Failure in the memory backup battery.
- Failure in the memory backup circuit.
- Failure in the RAM (main PWB, IC144, 145) or their peripheral circuits.
- Failure in the main PWB reset circuit.
- Failure in the DC power supply circuit.

**Troubleshooting action**

(1) Check the following:
  - Check the battery voltage.
    The battery is normal if the voltage across the test pin BCK-IN and GND is above 2.7V.
  - Check the memory backup circuit.
    Turn power off and measure the voltage on the RAM (main PWB, IC144, 145). If the voltage is above 2.0V, the voltaeg is normal.
  - Check the RAM (main PWB, IC144, 145) and its peripheral circuit.
    Refer to Electrical block.
  - Check the main PWB reset circuit.
    Turn power off and measure the voltage on the signal lines $\overline{\text{POFA}}$ (IC109, pin 14), $\overline{\text{REST}}$ (IC154, pin 13), and DCH (IC154, pin 6) if normal.
    Refer to Electrical block.
  - Check the DC power supply circuit.
    Turn power off and measure the voltage on the signal lines POF, FW and other votlages, if normal.
    Refer to Eelectrical block.

(2) Problemshoot the problem.
  a. If the battery is in failure.
    ① Turn the power switch off.
    ② Bind with solder a fresh battery parallel with the fatigued battery.
    ③ Remove the fatigued battery.
  NOTES:
  - Note polarity of battery.
  - Do not short battery.
  - Use the same type to replace with.
    If any one of above is disregarded, there is a possible explosion hazard.
  - Do the above steps ③ and ③ quickly.
    The unit below must be replaced depending on the cause.
  - Main PWB
  - DC power supply unit

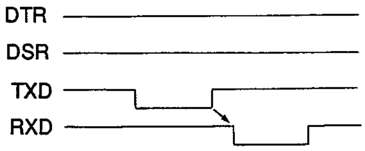
(3) Clear self diagnosis U2 problem.
The problem status turns off.

(4) Execute the test command 95.
All presettings will be set to the default values.

(5) Do the test command 59 and enter all preset values shown in the listing provided inside the front exterior.
Refer to 18-32.

(6) Do the test command 47 and take note of the AE sensor output characteristics.
Refer to 8-34.

| Status | Description |
|---|---|
| U3 | ○ Data transfer problem between the main PWB and the slave PWB, if the problem was detected by the main PWB.<br>○ Abnormal data is discovered when checking the AE sensor output characteristics with the test command 47. |

| Substatus | Description |
|---|---|
| 0 | ○ A data receive acknowledge command is not sent to the main PWB from the slave PWB, when data is transferred from the main PWB to the slave PWB.<br>The slave PWB fails to receive the data even though the data are transferred from the main PWB.<br>The data received by the slave PWB is not correct, when data are transferred from the main PWB.<br>A command from the slave PWB to the main PWB is not correct, when the main PWB sent the data to the slave PWB in normal way.<br>**Cause**<br>• Failure in a data line between the main PWB and the slave PWB such as connector and cable.<br>• Failure in the data communication channel with the main PWB.<br>• Failure in the data communication channel with the slave PWB.<br>**Troubleshooting action**<br>(1) Make a copy and check the following:<br>• Check the data line between the main PWB and the slave PWB.<br>Check the slave PWB, IC211, pin 17, if the data signal TXD is sent from the main PWB to the slave PWB.<br>Check the main PWB, IC134, pin 16, if the data signal TXD is sent from the slave PWB to the main PWB.<br>• Check the data communication channel of the main PWB.<br>• Check the data communication channel of the slave PWB.<br>After completion of data transfer when data are sent from the main PWB to the slave PWB, a data receive acknowledge command is sent from the slave PWB to the main PWB via the data line RXD.<br><br> <br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Slave PWB<br>(3) Turn the power switch off and on after completion of problemshooting.<br>The problem status turns off. |
| None | The Fuse 703 out |

| Status | Description |
|---|---|
| U3 | ○ Data transfer problem between the main PWB and the slave PWB which is detected by the main PWB.<br>○ Abnormal data measured in the AE sensor output characteristics (when test command 47 is executed). |

| Substatus | Description |
|---|---|
| 2 | ○ An abnormal data found during execution of the test command 47.<br>AE sensor output voltage too high.<br>AE sensor output voltage too low.<br>Magnitude of the copy lamp drive voltage does not match with that of the AE sensor output voltage.<br>Though the copy lamp drive voltage is increased, the AE sensor output voltage dropped. |

**Cause**

- A white document was not set correctly when executing the test command 47.
- A document other thuna white document was set when executing the test command 47.
- Failure in the AE sensor or its signal input circuit.
- Failure in the AE sensor input level adjustment.
- Failure in the copy lamp.
- Failure in the copy lamp control circuit.
- Failure in the copy lamp control circuit adjustment.

**Troubleshooting action**

(1) Execute the test command 7, 47, and 55 to check the following:
  - Check the document if not smeared.
  - Check the document set if it is not other than the white page.
  - Check the AE sensor and its signal input circuit.
    A U3 or U2 problem status may be evoked if the voltage of AE sensor signal PD (slave PWB, IC211, pin 41) is above 5.0V or below 0.1V.
    As the copy lamp drive voltage increases, the voltage of the AE sensor output signal PD also increases.
  - Check the AE sensor input level if appropriate.
    Mean value of the AE sensor output level should be 60 ± 1 when a white sheet of paper is measured using the test command 55.
    See 18-31.
  - Check the copy lamp control circuit.
    Copy lamp drive voltage varies in an increment of 5V (10V) up to 85V (170V~45V) of the copy lamp drive voltage, when the test command 47 is executed.
    A figure in parenthesis is for the 200V series machine.
    The copy lamp drive voltage is as described below, when the test command 7 is executed.
    See 18-6.
    100V series: 85V (Effective value)
    200V series: 170V (Effective value)

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
  - Main PWB
  - Slave PWB
  - Copy lamp control PWB

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| U | ○ Data transfer problem between the main PWB and the slave PWB which is detected by the slave PWB. |

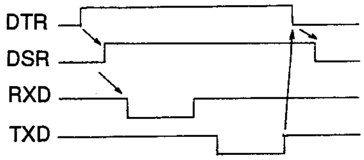
| Substatus | Description |
|---|---|
| 0 | ○ A data receive acknowledge command is not sent to the slave PWB from the main PWB, when data is transferred from the slave PWB to the main PWB.<br>The main PWB fails to receive the data even though the data are transferred from the slave PWB.<br>A command from the main PWB to the slave PWB is not correct, when the slave PWB sent the data to the main PWB in normal way. |

**Cause**

- Failure in a data line between the main PWB and the slave PWB such as connector and cable.
- Failure in the data communication channel with the main PWB.
- Failure in the data communication channel with the slave PWB.

**Troubleshooting action**

(1) Make a copy and check the following:
- Check the data line between the main PWB and the slave PWB.
  Check the main PWB, IC134, pin 15, if the data signal TXD is sent from the slave PWB to the main PWB.
  Check the slave PWB, IC211, pin 17, if the data signal TXD is sent from the main PWB to the slave PWB.
- Check the data communication channel of the main PWB.
- Check the data communication channel of the slave PWB.
  When transferring data from the slave PWB to the main PWB, a data transfer request signal DTR is sent to the slave PWB, IC211, pin 20, to the main PWB, IC126, pin 10. When the main PWB becomes ready to receive the data, a data receive ready signal DSR is sent from the main PWB, IC126, pin 10 to the slave PWB, IC211, pin 19, then the data are sent to the main PWB from the slave PWB. After completion of data transfer, a data receive complete signal is sent from the main PWB to the slave PWB on the data line TXD. After the data receive complete signal was completed from the main PWB to the slave PWB, the data transfer request signal DTR and the data transfer ready signal DSR turn off.



(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.
- Main PWB
- Slave PWB

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

Status: GA

Description

○ Abnormal data is discovered when setting the gamma sensor base level with the test command 60.

Substatus: 0

Description

○ The main corona grid voltage level is not proportional to the gamma sensor output voltage level.

Cause

- Failure in the gamma sensor or its signal input circuit.
- Failure in the gamma sensor adjustment.
- Failure in the developer block such as clutch, gear, motor.
- Failure in the developer unit adjustment such as toner concentration, MG roller doctor blade gap, bias voltage.
- Failure in the main corona or its control circuit.
- Failure in the main corona grid voltage adjustment.
- Failure in the primary transfer roller.
- Failure in the primary transfer voltage adjustment.
- Failure in the PC belt.
- Failure in the TX belt.

Troubleshooting action

(1) Execute the test command 8, 9, 10, 25 and 66 to check the following:

- Check the gamma sensor if adjusted properly.
- Check the gamma sensor and its input circuit.
  It is normal if the gamma sensor signal TMS (main PBW, IC146, pin 1) is within 4.0±0.1V and the gamma sensor output level is dispalyed within 70±2, when the test command 66 is executed.
  For adjustment, refer to .
- Check the developer block such as clutch, gear, motor.
- Check the developer block if properly adjusted such as toner concentration, MG roller doctor blade gap, bias voltage, MG roller main pole position.

☆ Check the developing bias voltage with the test command 8. The developing bias voltage should be 100V in the graphic copy mode, DC –80V in the photocopy mode, and DC –60V in the warmup mode.
With the test command 60, the developing bias voltage output is DC –100V.
The developing bias voltage of DC –100V is issued when the developing bias voltage on/off control signal $\overline{\text{DVB}}$ (main PWB, IC111, pin 15) is at a low level (0V) and the developing bias voltage control signal DVBC1 (main PWB, IC152, pin 1) is at high level (about 5V).

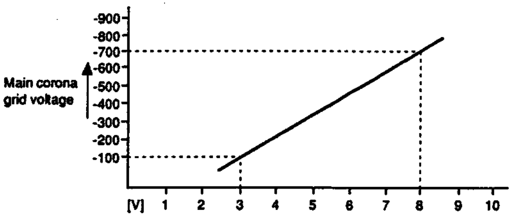
| Operation mode | Developing bias voltage | Developing bias voltage control signal | | | |
|---|---|---|---|---|---|
| | | $\overline{\text{DVBC1}}$ | $\overline{\text{DVBC2}}$ | $\overline{\text{DVBC3}}$ | $\overline{\text{DVBC}}$ |
| Graphic copy mode | DC –100V | H | L | L | 5.0V |
| Photocopy mode | DC –80V | L | H | L | 3.6V |
| Warmup mode | DC –60V | L | L | H | 3.2V |

See •• for the adjsutment procedure.

☆ MG roller doctor blade gap is 2.0±05mm. (Color DV unit)
See •• for the adjustment procedure.

☆ Check the action of the MG roller and the shutter clutch using the test command 25.
Developing takes place after the mix clutches $\overline{\text{DMC(Y)}}$ (main PWB, IC102, pin 14), $\overline{\text{DMC(M)}}$ (main PWB, IC102, pin 15), $\overline{\text{DMC(C)}}$ (main PWB, IC102, pin 16), MG roller clutch control signals $\overline{\text{DMGC(Y)}}$ (main PWB, IC101, pin 14), $\overline{\text{MGC(M)}}$ (main PWB, IC101, pin 15), $\overline{\text{DMGC(C)}}$ (main PWB, IC101, pin 16), shutter cltuch control signals $\overline{\text{DSC(Y)}}$ (main PWB, IC106, pin 14), $\overline{\text{DSC(M)}}$ (main PWB, IC106, pin 15), $\overline{\text{DSC(C)}}$ (main PWB, IC106, pin 16) turned low (0V).

- Check the main corona and its control circuit.
- Check the main corona grid voltage to see if properly adjusted.
  First, set the main PWB dip switch No.4 to the ON position. Turn the power switch off and on. Execute the test command 9, mode 1, to check the basic main corona grid voltage is within the specification.
  (Refer page 9-16)



| Status | Description |
|---|---|
| GA | ○ Abnormal data is discovered when setting the gamma sensor base level with the test command 60. |

| Substatus | Troubleshooting action |
|---|---|
| 0 | |

- Check the primary transfer roller and its control circuit.
- Check that the primary transfer roller voltage is properly adjusted.

When the test command 60 is executed, the first layer transfer voltage (DC –500V) is issued for the primary transfer roller voltage. When the primary transfer roller voltage control signal $\overline{\text{BTHV1}}$ (main PWB IC111 13pin) is at LOW level and $\overline{\text{BTHV2 \sim 4}}$ (Main PWB IC111, 10 ~ 12 pin) are at HIGH level (+30V), the transfer corona voltage (DC –600V) is supplied.
Check the transfer voltage current if described below with the test command 10 executed.
(Full color graphic mode, monochrome graphic/photo mode, black-white graphic/photo mode)

| Transfer mode | Primary transfer roller voltage control signal | | | | Primary transfer roller voltage |
|---|---|---|---|---|---|
| | $\overline{\text{BTHV1}}$ | $\overline{\text{BTHV2}}$ | $\overline{\text{BTHV3}}$ | $\overline{\text{BTHV4}}$ | |
| Color first layer | L | H | H | H | DC –500V |
| Color second layer | L | H | H | H | DC –500V |
| Color third layer (black-white mode) | H | H | H | L | DC –900V |
| Racing without transfer (when toner is retained) | H | L | H | H | DC –600V |

(Full color phot mode)

| Transfer mode | Primary transfer roller voltage control signal | | | | Primary transfer roller voltage |
|---|---|---|---|---|---|
| | $\overline{\text{BTHV1}}$ | $\overline{\text{BTHV2}}$ | $\overline{\text{BTHV3}}$ | $\overline{\text{BTHV4}}$ | |
| Color first layer | L | H | H | H | –500V |
| Color second layer | L | H | H | H | –500V |
| Color third layer | H | L | H | H | –600V |
| Color fourth layer | H | L | H | H | –600V |
| Color fifth layer | H | H | L | H | –700V |
| Color sixth layer | H | H | H | L | –900V |
| First ~ Fifth layer racing without transfer (when toner is retained) | L | H | H | H | –500V |
| Sixth layer racing without transfer (when toner is retained) | H | L | H | H | –600V |

See •• for the adjustment procedure.

- Check the PC belt for stains, scratches, and deformation.
- Check the TX belt for stains, scratches, and deformation.

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB
- Developer unit
- Main corona
- Primary transfer roller
- Primary transfer roller high voltage generating unit (FRHVG).
- Main corona high voltage generating unit (MHVG)/developing bias voltage generating unit (DVBG).

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| rP | ○ Secondary transfer roller problem. |

| Substatus | Description |
|---|---|
| ON | ○ The secondary transfer roller does not contact.<br>○ The secondary transfer roller position detector (TPRD) does not detect the contact of the transfer roller. The transfer roller position detect signal TRPD (main PWB, IC107, pin 3) does turn high level (+10V) within the limit shown next after the transfer roller clutch control signal $\overline{\text{TRTS}}$ (main PWB, IC103, pin 16) turned low level (0V). |

| Transfer speed | Limit |
|---|---|
| 184mm/sec | 600msec |
| 115mm/sec | 800msec |
| 60mm/sec | 1400msec |

**Cause**

- Failure in the secondary transfer roller clutch solenoid ($\overline{\text{TRTS}}$) control circuit.
- Failure in the secondary transfer roller position detector (TRPD) or its input circuit.
- Failure in a secondary transfer roller component.
- Failure in the secondary transfer roller clutch (TRCC) circuit.

**Troubleshooting action**

(1) Execute the test command 39 to check the following:

- Check the secondary transfer roller control circuit.
  The secondary transfer roller makes contact action each time when the secondary transfer roller clutch control signal (TRCC) (main PWB IC105, 5 pin) is low (0V) and the transfer roller clutch solenoid control signal TRTS (main PWB, IC103, pin 16) turned low in the given time.

| Transfer speed | $\overline{\text{TRTS}}$ low level period |
|---|---|
| 184mm/sec | 50msec |
| 115mm/sec | 80msec |
| 60mm/sec | 155msec |

- Check the secondary transfer roller positino detector and its input circuit.
  (The transfer roller positino detector signal TRPD (main PWB, IC107, in 3) is at a high level (+10V) when the transfer roller is in contact.)
- Check the secondary transfer roller mechanism.
  (Check if the PF motor rotation is conveyed to the secondary transfer roller clutch.)

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB
- Secondary transfer roller unit

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| rP | ○ Secondary transfer roller problem. |

| Substatus | Description |
|---|---|
| OF | ○ The secondary transfer roller does not disengage.<br>The secondary transfer roller position detect signal TRPD (main PWB, IC107, pin 3) does turn low level (0V) within the limit shown next after the transfer roller clutch control signal $\overline{\text{TRTS}}$ (main PWB, IC103, pin 16) turned low level (0V). |

| Transfer speed | Limit |
|---|---|
| 184mm/sec | 600msec |
| 115mm/sec | 800msec |
| 60mm/sec | 1400msec |

**Cause**

- Failure in the secondary transfer roller clutch solenoid (TRTS) control circuit.
- Failure in the secondary transfer roller position detector (TRPD) or its input circuit.
- Failure in a secondary transfer roller component.
- Failure in the secondary transfer roller clutch (TRCC) circuit.

**Troubleshooting action**

(1) Execute the test command 39 to check the following:

- Check the secondary transfer roller control circuit.
  (The secondary transfer roller makes engage and disengage action each time when the secondary transfer roller clutch control signal $\overline{\text{TRCC}}$ (main PWB IC105, 5pin) is low (0V) and the transfer roller clutch solenoid control signal $\overline{\text{TRTS}}$ (main PWB, IC103, pin 16) turned low in the given time.)

| Transfer speed | $\overline{\text{TRTS}}$ low level period |
|---|---|
| 184mm/sec | 50msec |
| 115mm/sec | 80msec |
| 60mm/sec | 155msec |

- Check the secondary transfer roller positino detector and its input circuit.
  The secondary transfer roller positino detector signal TRPD (main PWB, IC107, in 3) is at a low level (0V) when the transfer roller disengaged.
- Check the secondary transfer roller mechanism.
  Check if the PF motor rotation is conveyed to the secondary transfer roller clutch.

(2) Problemshoot the problem.
The unit below must be replaced depending on the cause.

- Main PWB

(3) Turn the power switch off and on after completion of problemshooting.
The problem status turns off.

| Status | Description |
|---|---|
| Blinking CH | ° Uninstalled developer cartridge.<br>° Developer cartridge installation sensor problem. |

| Substatus | Description | Cause | Troubleshooting action |
|---|---|---|---|
| None | ° Installation of the developer cartridge is not sensed.<br>The developer cartridge install signals DVS1 (main PWB, D108, anode) and DVS2 (main PWB, D109, anode) do not turn high level (2~3V). | • Failure in the developer cartride install signal input circuit.<br>• Failure in the developer cartridge connector.<br>• All developer cartridges are not installed. | (1) Check the following:<br>• Check the developer cartridge install signal input circuit.<br>When the yellow, magenta, and cyan developer cartriges are installed, the developer cartridge install signal DVS1 (main PWB, D108, anode) turn high (2~3V).<br>When the black developer cartridge is installed, the developer cartridge install signl DVS2 (main PWB, D109, anode) turns high level (2~3V).<br>If the main PWB dip switch No.5 is set to the off position, a blinking CH or SE is displayed unless all developer cartdige kinds are installed.<br>If the main PWB dip switch No.5 is set to the on position, a blinking CH or SE is not displayed when the yellow, magenta, cyan developer cartridges or a black developer cartridge is installed.<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Developer cartidge<br>The problem status turns off. |

| Status | Description |
|---|---|
| PC | ○ Uninstalled personal counter for the copier model with a personal counter option.<br>○ Unidentified password for the copier with an auditor option. |

| Substatus | Description |
|---|---|
| None | ○ The persoanl counter is not installed for the copier model with a personal counter option.<br>○ The persoanl counter installation failed to detect for the copier model with a personal counter option. For the model with the personal counter option, the personal counter install signal PNC-A (main PWB, D111, anode) does not turn high level (2~3V).<br>○ No password is entered for the model with an auditor option. For the model with the auditor option, the copy enable signal PNC-A (main PWB, D111, anode) does not turn high level (2~5V). |
| | **Cause** |
| | • Failure in the personal counter install signal input circuit.<br>• Failure in the personal counter itself.<br>• Failure in the auditor itself.<br>• Failure in the copy enable signal input circuit. |
| | **Troubleshooting action** |
| | (1) Check the following:<br>In the case of the machine with the personal counter option.<br>• Check the personal counter and the personal counter install signal input circuit. When the personal counter is installed, the personal counter install signal PNC-A (main PWB, D111, anode) turns high level (2~3V).<br>In the case of the machine with the auditor option.<br>• Check the auditor and the copy enable signal input circuit. When the password is entered correctly, the copy enable signal PNC-A (main PWB, D111, anode) turns high level (2~5V).<br>(2) Problemshoot the problem.<br>The unit below must be replaced depending on the cause.<br>• Main PWB<br>• Auditor or personal counter<br>The problem status goes out of the copy number window. |

| Status | Description |
|---|---|
| CP | ○ Key switch is not at ON position.<br>○ Key switch ON sense trouble. |

| Substatus | Description |
|---|---|
|  | ○ A key switch is failed to sense.<br>The key switch signal RKS (main PWB, D112, anode) does not turn high level (2~3V). |

**Cause**

- Failure in the key switch signal input circuit.
- Failure in a key switch.

**Troubleshooting action**

(1) Check the following:
  - Check key switch and its signal input circuit.
    When a key switch is pushed, the key switch signal RKS (main PWB, D112, anode) turns high level (2~3V).

(2) Problemshoot the problem.
  The unit below must be replaced depending on the cause.
  - Main PWB
  - Key switch
    Developer cartidge
    The problem status turns off.

| Status | Description |
|---|---|
| CH | ○ Front exterior incompletely closed.<br>○ A front exterior close sensor problem. |

| Substatus | Description |
|---|---|
| | ○ The front exterior open detector does not detect the closed exterior.<br>The front exterior open detector signal CSW (main PWB, IC112, pin 3) is at a low level (0V). |

**Cause**

- The front exterior is not completely closed.
- Failure in the front exterior open detector or its input circuit.

**Troubleshooting action**

(1) Check the following items:
  - Check the front exterior open detector (CSW) and its input circuit. (When the front exterior is closed, the front exterior open detector (CSW) signal CSW (main PWB IC 112 3 pin) is at HIGH level (+10V).
  - Check that the front exterior open detector (CSW) actuator is turned ON when the front exterior is closed.

(2) Repair the problem section.
  (If necessary, replace the following unit.)
  - Main PWB

  (The problem display turns off.)

# [18] TEST FUNCTIONS

## 1. General

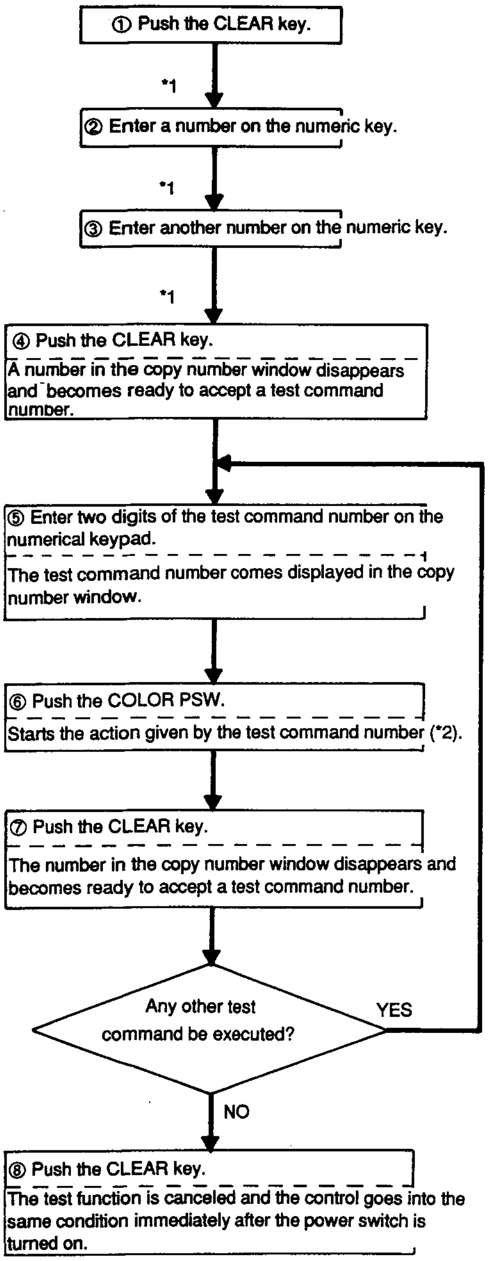
Test functions are provided to do the following:

- To operate only a limited area of the machine functional block to check mechanical action.
- To adjust mechanism.
- To cancel trouble status.
- To monitor operational status.
- To program machine functional setting.

## 2. Purpose

The test functions are used for improving serviceability of repairs and adjustments.

## 3. How test command is evoked


① Push the CLEAR key.
*1
② Enter a number on the numeric key.
*1
③ Enter another number on the numeric key.
*1
④ Push the CLEAR key.
A number in the copy number window disappears and becomes ready to accept a test command number.
⑤ Enter two digits of the test command number on the numerical keypad.
The test command number comes displayed in the copy number window.
⑥ Push the COLOR PSW.
Starts the action given by the test command number (*2).
⑦ Push the CLEAR key.
The number in the copy number window disappears and becomes ready to accept a test command number.
Any other test command be executed?
YES
NO
⑧ Push the CLEAR key.
The test function is canceled and the control goes into the same condition immediately after the power switch is turned on.

When the CLEAR key is pushed in a middle of the test function, the operation stops and the machine becomes ready to accept a next test function with the test command number in the copy quantity display disappeared.

*1: If each key depression was not done within five second's interval, the machine may not go into the test function.

*2: Depending on a kind of the test function, it may require another operational procedure.

## 4. List of test functions (Simulations)

| No. | Function |
|---|---|
| 1 | Used to move the lens base and make the mirror base scan. |
| | Used to set and reset the filters. |
| | Used to set and reset the screen. |
| | Used to disable the screen function. |
| 2 | Used to check operational status of the sensors and detectors in the optical section. |
| 3 | Used to check operational status of the sensors and detectors in the paper feed section. |
| 4 | Used to check operational status of the paper feed cassette size sensors. |
| 5 | Used to activate the front panel operational status lamps. |
| 6 | Used to turn on and off the heater lamps and fuser oil application solenoid. |
| | Used to turn on and off the fuser lubrication roller, solenoid. |
| 7 | Used to set copy lamps corresponding to the copy mode. |
| | Used to activate the copy lamps by the fixed voltage. (Used to calibrate copy lamp). |
| 8 | Used to issue developing bias voltage corresponding to the copy mode. |
| 9 | Used to issue main corona grid voltage appropriate to the copy mode. |
| 10 | Used to issue primary transfer roller voltage corresponding to the copy mode. |
| 11 | Used to issue the secondary transfer roller voltage corresponding to the copy mode. |
| 12 | Used to activate the blank lamps. |
| | Used to activate the discharge lamps. |
| | Used to activate the pre-transfer discharge lamps. |
| 13 | Used to cancel problem status U1. |
| 14 | Used to cancel problem status H3, H4. |
| 15 | Used to clear jam (mis-feed) counter. |
| 16 | Used to display the copy maintenance preset counter reading. |
| | Used to display the scan maintenance preset counter reading. |
| 17 | Used to display jam (mis-feed) positions max. 100 times.<br>Used to display the total number of jam occurance. |
| 19 | Used to display the copy maintenance counter reading. |
| | Used to display the scan maintenance counter reading. |
| 20 | Used to clear the copy maintenance counter. |
| | Used to clear the scan maintenance counter. |
| 21 | Used to check the warmup time. |
| | Used to set the multicopy function. |
| 22 | Used to check warmup time. |
| | Used to set the multicopy function disregarding misfeed check function. |
| 23 | Used to set the multicopy function without fuser temperature control, and misfeed check functions. |
| 24 | Used to disable the warmup function.<br>Used to evoke test commands without warmup. |
| 25 | Used to activate drive system. Used to adjust toner concentration. |
| 26 | The lens base will move and pause at each position of the fixed magnification ratios. |
| 27 | Used to repeatedly move the lens and pause at each position of the fixed magnification rations. |
| 28 | Displays the fuser temperature set value, also used to set fuser temperature. |
| 29 | Used to simulate installation of selected developer units. |
| | To simulate an under toned condition. |
| 37 | Used to turn on and off the TX belt cleaner. |
| | Used to turn on and off the PC belt cleaner. |
| | Used to apply toner on the PC belt. |
| | Used to turn on and off the TX belt TB cleaning roller. |
| 39 | The copying operation takes place without issuing secondary transfer voltage. |
| | Used to engage and disengage the secondary transfer roller. |
| 40 | Used to display the preset developer counter reading. |
| 41 | Used to display the developer counter reading. |
| 42 | Used to clear the developer counter. |
| 45 | Used to set the PC belt sensitivity setting. |
| 46 | Used to adjust copy quality (copy density) in the manual copy mode.) |
| 47 | Used to store AE sensor output characteristics in the memory. |

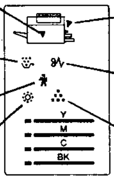
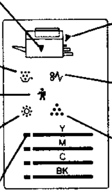
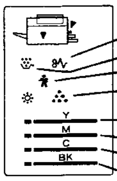
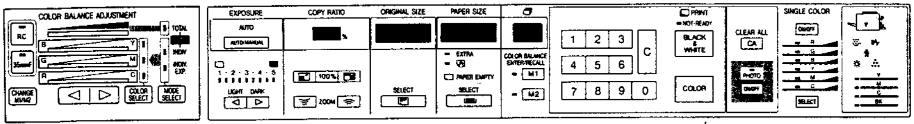
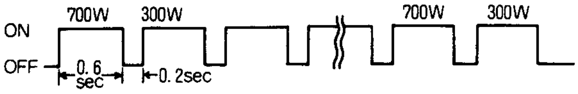
| No. | Function |
|---|---|
| 48 | Used to adjust vertical copy magnification ratio. |
| 49 | Used to adjust horizontal copy magnification ratio. |
| 50 | Used to adjust copy lead edge image loss. (resist roller and mirror base start timing). |
| 51 | Used to adjust the copy quality (density) in the auto black/white graphic mode. |
| 52 | Used to program the AE sensor limit. |
| 53 | Used to adjust copy quality (copy density, copy contrast) in the preset auto copy mode. |
| 54 | Used to adjust paper feed variation. (Transport roller off timing). |
| 55 | Used to display the AE sensor output level. |
| 56 | Used to set the function that displays the status of the copy lamp drive voltage control signal. |
|  | Used to set the function that displays the status of the main corona grid voltage control signal. |
|  | Used to set the function that displays the status of the developing bias control signal. |
| 57 | Used to adjust reference main corona grid voltage. |
| 58 | Used to adjust copy lead edge void area. (Blank lamp timing). |
| 59 | Used to display and program test command settings. |
| 60 | Used to program the gamma sensor reference level. |
| 61 | Used to manually perform gamma correction. |
|  | Used to display gamma sensor output level and reference level. |
| 63 | Used to adjust the copy quality (copy density) in the full color auto graphic copy mode. |
| 65 | Used to display the AE sensor output level when the limiter is in active. |
| 66 | Used to adjust the gamma sensor PWB. |
| 79 | Used to set specification. |
| 95 | Used to set default setting. |
| 96 | The lens base shifts to the 64% position. |
|  | All filters are reset. |
|  | The mirror base moves to the home position. |
|  | The screen resets. |
| 99 | Used to set function which displays the A/D converter output level. |

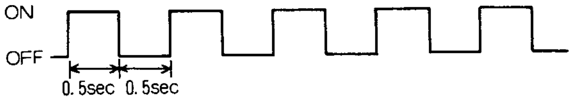
## 5. Description

| S No. | Description | Function |
|---|---|---|
| 1 | o Used to make the mirror base scan.<br>o Used to move the lens base.<br>o Used to set/reset the filters.<br>o Used to set/reset the screen.<br>o Used to set the function where the screen is not set. | • Used to check the optical system and its control circuit.<br>• Copy operation without screen (in photo copy mode) |
|  | Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 1 → COLOR PSW and do the following to select the subitem.<br>(1) To move the mirror base and lens base.<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The lens base will move through the following positions.<br>The preset magnification ratio – reduce(x0.64) – normal<br>• The mirror base makes a scan.<br>(To repeat the above action, push the COLOR PSW once again.) | • Used to check the lens base.<br>• Used to check the lens motor (LM) and its control circuit (slave PWB).<br>• Used to check the mirror base movement.<br>• Used to check the mirror motor (MIRM) and its control circuit (mirror motor control PWB). |
|  | (2) To repeat alternate setting of filters<br>① Type "2".<br>• "2" displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• Filters are alternately set in the order shown below with the kind of the filter being indicated by the monochrome indicator.<br>When one of numeric keys 1 ~ 4 is pushed during the test operation, the setting operation is immediately halted and the state at that moment is retained. The set time of each filter is about 1 sec.<br>→ ND filter → B filter → G filter → R filter | • Used to check filter setting action.<br>• Used to clean filter.<br>• Used to check the action of the filter motor (FM) and its control circuit (slave PWB).<br>• Used for aging test of the filter set action. |

| Filter kind | Monochrome indicator |
|---|---|
| ND filter | Cyan |
| Red filter | Red |
| Green filter | Green |
| Blue filter | Blue |

| S No. | Description | Function |
|---|---|---|
|  | (3) Procedures to repeat the screen setting operation.<br>① Push numeric key 3.<br>• "3" is displayed on the copy quantity indicator.<br>② Turn on the COLOR PSW.<br>• The screen setting/resetting operations are repeated in the cycle of about 0.5sec.<br>• When the screen home position sensor senses the screen (the screen is in reset state), the paper entry misfeed position lamp lights up. | • Used to check the screen setting operation. |
|  | (4) Procedure to set the function that inhibits setting of the screen<br>① Push numeric key 4.<br>• "4" is displayed on the copy quantity indicator.<br>② Push the COLOR PSW.<br>• A function where the screen is not set is set.<br>• The copy quantity indicator turns off to go into standby state for test command No. input.<br>(Note) • To cancel the function set in this procedure, perform one of the following operations.<br>① C → 0 → 0 → C<br>② Turn off the power switch.<br>• Always perform the above operation before starting copying to cancel the function set in this test command.<br>When a numeric key 1, 2, 3, or 4 is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection. | • Used to disable the screen function. |

| S No. | Description | Function |
|---|---|---|
| 2 | o Used to check the operational status of the optical sensors and detectors. | • Used to check the optical sensors/detectors and their circuits. |
| | ON when the filter home position sensor (FHPS) is active.<br><br>ON when the mirror base home position sensor-2 (MHPS2) is active.<br>ON when the lens home position sensor is active.<br>ON when the screen home position sensor (SHPS) is active.<br>ON when the mirror base position sensor-1 (MHPS1) is active.<br>ON when the mirror base scan sensor (MSS1/MSS2) is active.<br>ON when the mirror base is advancing and OFF when returning. | • Used to check the following sensors/detectors and their circuits.<br>Filter home position sensor (FHPS)<br>Mirror base home position sensor (MHPS1/MHPS2).<br>Lens home position sensor (LHPS)<br>Mirror base scan sensor (MSS1/MSS2)<br>Screen home position sensor (SHPS) |
| 3 | o Used to check the operational status of the paper feed sensors and detectors. | • Used to check the operational status of the paper feed sensors and detectors. |
| | ON when the separation detector (PSD) is active.<br><br>ON when the manual feed paper pass detector (PPD1) is active.<br>ON when the transparent film detector (TD) is active.<br>ON when the lower cassette paper detector (PED3) is active.<br>ON when the paper pass detector (PPD2) in front of the resist roller.<br>ON when the paper exit detector (POD) is active.<br>ON when the upper cassette paper detector (PED2) is active.<br>ON when the manual feed paper detector (PPD1) is active. | • Used to check the operational status of the following sensors and detectors.<br>Manual feed paper pass detector (PPD1)<br>Manual feed paper detector (PED1)<br>Upper cassette paper detector (PED2)<br>Lower cassette paper detector (PED3)<br>Separation detector (PSD)<br>Paper exit detector (POD)<br>Transparent paper detector (TS)<br>Paper pass detector (PPD2) in front of the resist roller |
| 4 | o Used to check the operational status of the paper cassette size sensors. | • Used to check the cassette size sensors and its circuit. |
| | <br>ON when SW4 is active.<br>ON when SW3 is active.<br>ON when SW2 is active.<br>ON when SW1 is active.<br>Lower cassette size sensor (CSS2)<br>ON when SW4 is active.<br>ON when SW3 is active.<br>ON when SW2 is active.<br>ON when SW1 is active.<br>Upper cassette size sensor (CSS1) | • Used to check the following sensors and detectors and their circuits.<br>Used to check action of the upper cassette size sensor (CSS1).<br>Used to check action of the lower cassette size sensor (CSS2). |
| 5 | o Used to activate the front panel operational status lamps. | • Used to check the front panel operational status lamps and its control circuit (main PWB, operation PWB). |
| | • Each time the COLOR PSW is pushed, the indicators on the left half and on the right half of the indicator panel alternately turn on.<br>On (OFF) ←│→ OFF (ON)<br> COLOR BALANCE ADJUSTMENT<br>RC<br>35mmF<br>TOTAL<br>INDIV.<br>INDIV. EXP.<br>CHANGE M1/M2<br>COLOR SELECT<br>MODE SELECT<br>EXPOSURE<br>AUTO<br>AUTO/MANUAL<br>LIGHT DARK<br>COPY RATIO<br>100%<br>ZOOM<br>ORIGINAL SIZE<br>SELECT<br>PAPER SIZE<br>EXTRA<br>PAPER EMPTY<br>SELECT<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>1 2 3 4 5 6 7 8 9 0 C<br>PRINT<br>NOT-READY<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>SELECT<br>Y<br>M<br>C<br>BK | |
| 6 | o Used to turn on and off the heater lamps.<br>o Used to turn on and off the fuser oil applying roller.<br>o The fuser oil sensor operation can be monitored. | • Used to check the fuser and its control circuit. |
| | Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 6 → COLOR PSW and do the following to select the subitem.<br>(1) To turn on and off the heater lamps<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The 700W and 300W heater lamps turn on and off for five times (see figure below).<br> | • Used to check the heater lamps and their control circuits (main PWB, heater lamp driver SSR, AC circuit PWB). |

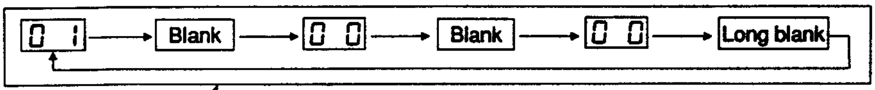
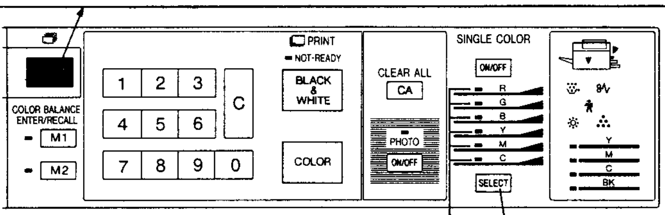
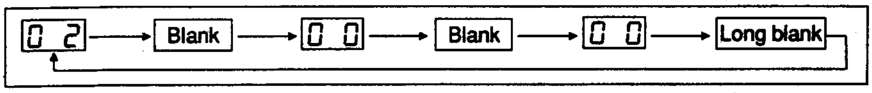
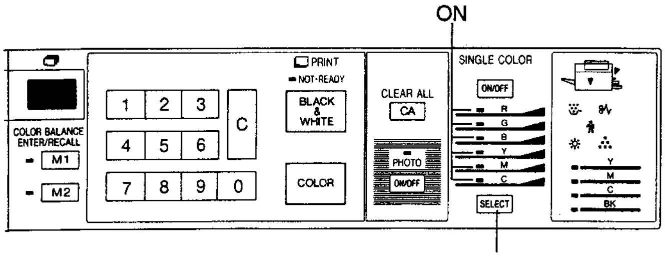
<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>6</td><td>Each depression of the COLOR PSW causes the above operation.<br>(2) To turn on and off the fuser lubrication roller.<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The fuser lubrication roller turn on and off (see figure below).<br><br> <br>Each depression of the COLOR PSW causes the above operation.<br>When the fuser oil sensor senses oil (there is oil), the developer lamp turns on.<br>If a numeric key "1"or "2" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td>• Used to check the fuser lubrication roller and its control circuit (main PWB).</td></tr>
<tr><td>7</td><td>o Used to activate the copy lamps with the voltage corresponding to the filter being used and the copy mode selected.<br>o Used to activate the copy lamps by the fixed voltage.<br>- - - - - - - - - -<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 7 → COLOR PSW and do the following to select the subitem.<br>(1) To activate the copy lamps with the voltage appropriate to the copy mode and the filter selected<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Set the copy mode.<br>③ Select the filter using the paper size select key.<br>The selected filter kind will be indicated on the developer indicator.<br>• The developer indicator relative to the selected filter turns on.
<table>
<tr><th>Filter kind</th><th>Indicator<br>(relevant developer indictor ON)</th></tr>
<tr><td>ND filter</td><td>Black</td></tr>
<tr><td>Red filter</td><td>Cyan</td></tr>
<tr><td>Green filter</td><td>Magenta</td></tr>
<tr><td>Blue filter</td><td>Yellow</td></tr>
</table>
NOTE: Selection of the filter using the paper size select key in this test function would not change the state of filter set.<br>④ Select the monochrome mode, full color mode, or black-and-white mode with the monochrome select key. (At that time, the selected mode is displayed with the monochrome lamp and developer lamps.)<br>Relation of copy mode vs. copy lamp activating condition</td><td>• Used to check the copy lamps and their control circuit (slave PWB, CLC PWB).</td></tr>
<tr><td></td><td colspan="2">
<table>
<tr><th colspan="2">Copy mode</th><th>Monochrome lamp</th><th>Developer lamp</th><th>Photo lamp</th><th>Copy lamp lighting condition</th></tr>
<tr><td rowspan="9">Full color</td><td>Graphic</td><td rowspan="9">All lamps OFF</td><td rowspan="2">Y lights.</td><td>OFF</td><td rowspan="3">Copy lamp applying voltage (*A) in exposure with the blue filter</td></tr>
<tr><td>Photo (LD)</td><td>ON</td></tr>
<tr><td>Photo (HD)</td><td>Y blinks.</td><td>ON</td></tr>
<tr><td>Graphic</td><td rowspan="2">M lights.</td><td>OFF</td><td rowspan="3">Copy lamp applying voltage (*B) in exposure with the green filter</td></tr>
<tr><td>Photo (LD)</td><td>ON</td></tr>
<tr><td>Photo (HD)</td><td>M blinks.</td><td>ON</td></tr>
<tr><td>Graphic</td><td rowspan="2">C lights.</td><td>OFF</td><td rowspan="3">Copy lamp applying voltage (*B) in exposure with the red filter</td></tr>
<tr><td>Photo (LD)</td><td>ON</td></tr>
<tr><td>Photo (HD)</td><td>C blinks.</td><td>ON</td></tr>
<tr><td rowspan="12">Monochrome</td><td rowspan="2">Graphic</td><td>R ON</td><td rowspan="4">Y lights.</td><td rowspan="2">OFF</td><td rowspan="4">Copy lamp applying voltage (*B) in exposure with the ND filter</td></tr>
<tr><td rowspan="2">G ON</td></tr>
<tr><td rowspan="2">Photo</td><td rowspan="2">ON</td></tr>
<tr><td>Y ON</td></tr>
<tr><td rowspan="2">Graphic</td><td>R ON</td><td rowspan="4">M lights.</td><td rowspan="2">OFF</td><td rowspan="4">Copy lamp applying voltage (*B) in exposure with the ND filter</td></tr>
<tr><td rowspan="2">B ON</td></tr>
<tr><td rowspan="2">Photo</td><td rowspan="2">ON</td></tr>
<tr><td>M ON</td></tr>
<tr><td rowspan="2">Graphic</td><td>G ON</td><td rowspan="4">C lights.</td><td rowspan="2">OFF</td><td rowspan="4">Copy lamp applying voltage (*B) in exposure with the ND filter</td></tr>
<tr><td rowspan="2">B ON</td></tr>
<tr><td rowspan="2">Photo</td><td rowspan="2">ON</td></tr>
<tr><td>C ON</td></tr>
<tr><td rowspan="2">Black-and-white</td><td>Graphic</td><td rowspan="2">All lamps OFF</td><td rowspan="2">B lights.</td><td>OFF</td><td rowspan="2">Copy lamp applying voltage (*B) in exposure with the ND filter</td></tr>
<tr><td>Photo</td><td>ON</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>7</td><td>*A: Both the main and sub copy lamps turn on.<br>*B: Only the main copy lamp turns on.<br>Copy lamp drive voltage is dependent on the copy mode (photo, full color, monochrome, black/white), contrast, exposure level, filter in use. The copy lamp drive voltage corresponding to the filter can be selected using the paper size select key.<br>(Ex-1): When the COLOR PSW is pushed after activating the magenta developer indicator, the copy lamp is driven by the intensity used for the green filter color separation in the full color copy mode.<br>(Ex-2): When the COLOR PSW is pushed in the monochrome copy mode, the copy lamp turns on with the intensity for the ND filter.<br>(Ex-3): Selection between the graphic and photo modes is made with the photo mode ON/OFF key.<br>When the full color photo mode is selected, depressing the paper size key switches Photo (LD) and Photo (HD).<br>(The is checked with the developer lamp ON/OFF.)<br>⑤ Push the COLOR PSW or BLACK-WHITE PSW.<br>• The copy lamp(s) turns on for a six seconds by the copy lamp drive voltage appropriate to the condition selected on the front panel.<br>(Note) In the photo mode, though the copy density level is changed, the copy lamp drive voltage is not changed.<br>In the monochrom mode, though the levels of the blind panel operation block are changed, the copy lamp drive voltage is not changed.<br>(2) To activate the copy lamp by the fixed voltage<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The copy lamp turns on for a period of six seconds with the voltage shown below.
<table>
<tr><th>AC voltage</th><th>Copy lamp dirve voltage (rms)</th></tr>
<tr><td>100V</td><td>80V</td></tr>
<tr><td>200V</td><td>160V</td></tr>
</table>
NOTE: • Do not repeat this test.<br>If done continuously, one of the following problem you may meet.<br>☆ Because the PC belt is exposed on the same area repeatedly, partial fatigue appears in the PC belt so that a copy density fluctuation may occur on the copy.<br>☆ Abnormally high temperature in the document table causes the document cover to distort.<br>If numeric key "1"or "2" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td>• Adjustment of the CLC PWB</td></tr>
<tr><td>8</td><td>o Used to issue the developing bias voltage appropriate to the copy mode.<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 8 → COLOR PSW and do the following to select the subitem.<br>(1) To issue the developing bias voltage in the graphic copy mode and full color photo (HD) mode<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The developing bias voltage (DC –100V) is issued for a period of 30 seconds in the graphic copy mode or full color photo (HD) copy mode.<br>(2) To issue the developing bias voltage in the photo copy mode or full color photo (LD) copy mode.<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>• The photocopy mode indicator blinks.<br>② Push the COLOR PSW.<br>• The developing bias voltage (DC –80V) is issued for a period of 30 seconds in the photo copy mode or full color photo (LD) copy mode.</td><td>• Used to adjust the developing bias voltage.<br>• Used to check the developing bias control circuit (main PWB, MHVG, developing bias PWB).<br>• Used to check the developing bias voltage.</td></tr>
</table>

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>8</td><td>(3) To issue the warm-up mode developing bias voltage<br>① Type "3".<br>• "3" is displayed in the copy quantity display.<br>• The not-ready indicator blinks.<br>② Push the COLOR PSW.<br>• The warm-up mode developing bias (DC −60V) is issued for a period of 30 seconds.<br>If a numeric key "1", "2", or "3" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td></td></tr>
<tr><td rowspan="2">9</td><td>○ Used to issue the main corona grid voltage corresponding to the copy mode.</td><td></td></tr>
<tr><td>Push C → 0 → 0 → C → 9 → COLOR PSW and do the following to select the subitem.<br><br>(1) To issue the main corona grid voltage (MHVG) appropriate to the copy mode<br>① Select either the photo or graphic copy mode.<br>② Select the monochrome mode or the full color mode.<br>When the monochrome mode is selected, all the monochrome lamps turn on.<br>The black-white mode is not related to the monochrom lamp ON-OFF.<br>③ Select the operation mode using the paper size select key.<br>The selected image mode can be checked on the developer indicator.<br>
<table>
<tr><th>Monochrome lamp</th><th>Developer lamp</th><th>Photo lamp</th><th colspan="3">Grid voltage output mode</th></tr>
<tr><td rowspan="9">All lamps OFF</td><td rowspan="2">Y ON</td><td>OFF</td><td rowspan="9">Full color</td><td>Graphic</td><td rowspan="3">Y image formed</td></tr>
<tr><td>ON</td><td>Photo (LD)</td></tr>
<tr><td>Y blinks.</td><td>ON</td><td>Photo (HD)</td></tr>
<tr><td rowspan="2">M ON</td><td>OFF</td><td>Graphic</td><td rowspan="3">M image formed</td></tr>
<tr><td>ON</td><td>Photo (LD)</td></tr>
<tr><td>M blinks.</td><td>ON</td><td>Photo (HD)</td></tr>
<tr><td rowspan="2">C ON</td><td>OFF</td><td>Graphic</td><td rowspan="3">C image formed</td></tr>
<tr><td>ON</td><td>Photo (LD)</td></tr>
<tr><td>C blinks.</td><td>ON</td><td>Photo (HD)</td></tr>
<tr><td rowspan="6">All lamps ON</td><td rowspan="2">Y ON</td><td>OFF</td><td rowspan="6">Monochrome</td><td>Graphic</td><td rowspan="2">Y image formed</td></tr>
<tr><td>ON</td><td>Photo</td></tr>
<tr><td rowspan="2">M ON</td><td>OFF</td><td>Graphic</td><td rowspan="2">M image formed</td></tr>
<tr><td>ON</td><td>Photo</td></tr>
<tr><td rowspan="2">C ON</td><td>OFF</td><td>Graphic</td><td rowspan="2">C image formed</td></tr>
<tr><td>ON</td><td>Photo</td></tr>
<tr><td rowspan="2">Not related to ON/OFF.</td><td rowspan="2">BK ON</td><td>OFF</td><td rowspan="2">Balck-white</td><td>Graphic</td><td rowspan="2">BK image formed</td></tr>
<tr><td>ON</td><td>Photo</td></tr>
</table>
④ Push the COLOR PSW.<br>• The main corona grid voltage (MHVG) appropriate to the copy mode (image mode and presets on the front panel) is issued for a period of 30 seconds.<br>(Note) When the copy density level is changed, the main corona grid voltage is changed in the photo mode, but is not changed in the graphic mode.<br>In the monochrome mode, though the levels of the blind panel operation block are changed, the main corona grid voltage is not changed.<br>(2) Procedure to supply the reference main corona grid voltage (MHGV)<br>① Turn on the main PWB DIP switch No. 4.<br>② Turn off and on the power switch.<br>③ Perform the following key operations:<br>C → 0 → 0 → C → 9 → COLOR PSW<br>④ Perform procedure (1)-① through ③.<br>⑤ Push the COLOR PSW.<br>• The reference main corona grid voltage (MHGV) (which is not subject to gamma correction) is supplied for 30 sec.<br>The voltage supplied at that moment is the voltage which has been set in test command 57.</td><td>• Used to check the main corona grid voltage control circuit (MHVG, developing bias PWB, main PWB).<br><br>• S57 used to adjust the main corona grid voltage.<br>• Used to check the main corona grid voltage.</td></tr>
</table>

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>9</td><td>If the monochrome copy select key, the photo/graphic mode select key, or the paper size select key is pushed during the test operation, the test is halted, and the machine goes into the standby state for the operation mode selection.<br>The ready lamp turns off during the test operation.</td><td></td></tr>
<tr><td rowspan="4">10</td><td>o Used to issue the 1st transfer roller voltage (FRHVG) corresponding to the copy mode.</td><td></td></tr>
<tr><td>Push C → 0 → 0 → C → 1 → 0 → COLOR PSW and do the following to select the subitem.<br>① Select the TX mode using using the paper size select key.<br>The selected TX voltage output using mode is indicated on the developer indicator.
<table>
<tr><th>Monitor indicator (developer indicator ON)</th><th>Voltage (FRHVG)</th></tr>
<tr><td>Y</td><td>BTHV-A (DC –500±15V)</td></tr>
<tr><td>M</td><td>BTHV-B (DC –600±15V)</td></tr>
<tr><td>C</td><td>BTHV-C (DC –700±15V)</td></tr>
<tr><td>BK</td><td>BTHV-D (DC –900±15V)</td></tr>
</table>
② Push the COLOR PSW.<br>• The primary transfer roller voltage (FRHVG) appropriate to the transfer mode is issued.<br>If the paper size select key is pushed during the test operation, the test operation is halted and the machine goes into standby state for the transfer voltage output mode selection.<br>During the test operation, the ready lamp turns off.<br>The relation between each copy mode and transfer corona voltage is as shown below:</td><td>• Used to check the 1st transfer roller (FRHVG) control circuit (FRHVG PWB, main PWB).<br>• Used to adjust the 1st transfer roller voltage.<br>• Used to check the 1st transfer roller voltage.</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Transfer mode</th><th>Black-white copy mode</th><th>Monochrome copy mode (Y, M, C)</th><th>Monochrome copy mode (R, G, B)</th><th>Full color graphic mode</th><th>Full color photo mode</th></tr>
<tr><td>First layer transfer</td><td>900V (BTHVD)</td><td>500V (BTHVA)</td><td>500V (BTHVA)</td><td>500V (BTHVA)</td><td>500V (BTHVA)</td></tr>
<tr><td>Second layer transfer</td><td>—</td><td>—</td><td>500V (BTHVA)</td><td>500V (BTHVA)</td><td>500V (BTHVA)</td></tr>
<tr><td>Third layer transfer</td><td>—</td><td>—</td><td>—</td><td>900V (BTHVD)</td><td>600V (BTHVB)</td></tr>
<tr><td>Fourth layer tranfser</td><td>—</td><td>—</td><td>—</td><td>—</td><td>600V (BTHVB)</td></tr>
<tr><td>Fifth layer tranfser</td><td>—</td><td>—</td><td>—</td><td>—</td><td>700V (BTHVC)</td></tr>
<tr><td>Sixth layer transfer</td><td>—</td><td>—</td><td>—</td><td>—</td><td>900V (BTHVD)</td></tr>
<tr><td>No transfer, racing</td><td>600V (BTHVB)</td><td>600V (BTHVB)</td><td>600V (BTHVB)</td><td>600V (BTHVB)</td><td>*</td></tr>
</table>
</td></tr>
<tr><td>* In the full color photo mode, when the first ~ fifth layer racing without transfer: 500V (BTHVA).<br>When the sixth layer racing without transfer: 600V (BTHVB).</td><td></td></tr>
<tr><td rowspan="2">11</td><td>o Used to issue the secondary transfer roller voltage (SRHVG) corresponding to the copy mode.</td><td rowspan="2">• Used to check the secondary transfer roller added voltage (SRHVG).<br>• Used to check the secondary transfer voltage control circuit (main PWB, SRHVG).<br>• Used to adjust the secondary transfer roller added voltage.</td></tr>
<tr><td>Push C → 0 → 0 → C → 1 → 1 → COLOR PSW and do the following to select the subitem.<br>(1) To issue the transfer voltage (PTHV-A) to transfer the single color toned image from the TX belt to the paper.<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The transfer voltage (PTHV-A) is issued for a period of 30 seconds to transfer the single color toned image from the TX belt to the paper.<br>(2) To issue the transfer voltage (PTHV-A) to transfer a multiple single color toned image from the TX belt to the paper.<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The transfer voltage (PTHV-B) is issued for a period of 30 seconds to transfer the multiple color toned image from the transfer to the paper.</td></tr>
</table>

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>11</td><td>(3) To issue the transfer voltage (PTHV-C) to transfer the toned image from the TX belt to the OHP film.<br>① Type "3".<br>• "3" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The transfer voltage (PTHV-C) is issued for a period of 30 seconds to transfer the toned image from the TX belt to the OHP film.<br>Relation of the secondary transfer roller voltage (SRHVG) vs. transfer mode
<table>
<tr><th rowspan="2">Transfer voltage</th><th colspan="4">Tramsfer conditions</th><th rowspan="2">Specified voltage</th><th rowspan="2">SRHVG adjusting VR</th></tr>
<tr><th>Transfer speed</th><th>Toner used</th><th>Transfer paper kind</th><th>Copy mode</th></tr>
<tr><td>PTHV-A</td><td>184mm/sec</td><td>Two or more</td><td>Plain paper (Length in transport direction 216mm or less)</td><td>Full color, monochrome (R, G, B)</td><td>DC −1.6±0.05KV</td><td>VR-A</td></tr>
<tr><td rowspan="2">PTHV-B</td><td>184mm/sec</td><td>One</td><td>Plain paper</td><td>Black-white monochrome (Y, M, C)</td><td rowspan="2">DC −1.4±0.05KV</td><td rowspan="2">VR-B</td></tr>
<tr><td>115mm/sec</td><td>Two or more</td><td>Plain paper (Length in transport direction 216mm or more)</td><td>Full color, monochrome (R, G, B)</td></tr>
<tr><td>PTHV-C</td><td>60m/sec</td><td>Not related</td><td>OHP film</td><td>All modes</td><td>DC −2.0±0.05KV</td><td>VR-C</td></tr>
</table>
If a numeric key "1", "2", or "3" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td></td></tr>
<tr><td>12</td><td>○ Used to activate the blank lamps (BL).<br>○ Used to activate the discharge lamps (DL).<br>○ Used to activate the pre-TX discharge lamps (PDL).<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 1 → 2 → COLOR PSW and do the following to select the subitem.<br>(1) To activate the blank lamps (BL)<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• Blank lamps (BL) start activating from both ends, 0.3 second for each lamp.<br>(2) To activate the discharge lamps (DL)<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• Discharge lamps to activate for a period of 30 seconds.<br>(3) To activate the pre-TX discharge lamps (PDL)<br>① Type "3".<br>• "3" is displayed in the copy quantity display.<br>• The pre-TX discharge lamps to activate for a period of 30 seconds.<br>If a numeric key "1", "2", or "3" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td>• Used to check the blank lamps (BL) and their control circuit (main PWB).<br>• Used to check the discharge lamps (DL) and their control circuit (main PWB).<br>• Used to check the pre-TX discharge lamp (PDL) and their control circuit (main PWB).</td></tr>
<tr><td>13</td><td>○ Used to cancel problem status U1 (low memory backup battery).<br>This command should be executed after replacing the memory backup battery with a fresh one.</td><td>• Used to cancel U1 problem status (low main PWB memory backup battery voltage).</td></tr>
<tr><td>14</td><td>○ Used to cancel problem status H3 (abnormally high fuser temperature), H4 (abnormally low fuser temperature).<br>This test function must be executed after repairing the problems.</td><td>• Used to cancel problem status H3 (high fuser temperature), H4 (low fuser temperature).</td></tr>
</table>

| S No. | Description | Function |
|---|---|---|
| 15 | ○ Used to clear the jam counter. (The counter content becomes 0.)<br>Push C → 0 → 0 → C → 15 → COLOR PSW, (the photo copy mode lamp blinks), and perform the following procedure.<br>① Push the photo/graphic copy mode select key.<br>• "CL" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The jam counter is cleared. (The jam counter content becomes 0.)<br>• The jam counter content is dispayed in 2 digits x 3 times in the copy quantity display. | • Jam counter clear (The counter content becomes 0.) |
| 16 | ○ Used to display the copy maintenance preset counter reading.<br>○ Used to display the scan maintenance preset counter reading.<br>The mode must be selected using the spec select dip switch on the main PWB and the monochrome select key on the front panel.<br>(1) To display the copy maintenance preset counter reading.<br>① Set the main PWB spec select dip switch No.8 to the ON position.<br>② Push C → 0 → 0 → C → 1 → 6 → COLOR PSW.<br>③ Turn off all monochrome indicators using the monochrome select key.<br>④ Push the COLOR PSW.<br>• The copy maintenance preset counter reading (10000) is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br> 0 1<br>Blank<br>0 0<br>Blank<br>0 0<br>Long blank<br><br> PRINT<br>NOT-READY<br>1 2 3 4 5 6 7 8 9 0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R G B Y M C<br>SELECT<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>Y M C BK<br>OFF<br>Monochrome select key<br>(2) To display the scan maintenance preset counter reading. (This can be displayed irrespective of the dip switch position.)<br>a. If the dip switch is at the OFF position.<br>① Push C → 0 → 0 → C → 1 → 6 → COLOR PSW.<br>• The scan maintenance preset counter reading (20000) is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br> 0 2<br>Blank<br>0 0<br>Blank<br>0 0<br>Long blank<br>b. If the dip switch is at the ON position.<br>① Push C → 0 → 0 → C → 1 → 6 → COLOR PSW.<br>② Turn off all monochrome indicators using the monochrome select key.<br>③ Push the COLOR PSW.<br>• The scan maintenance preset counter reading (20000) is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br> ON<br>PRINT<br>NOT-READY<br>1 2 3 4 5 6 7 8 9 0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R G B Y M C<br>SELECT<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>Y M C BK<br>Monochrome select key | • Used to check the copy number maintenance preset counter.<br>• Used to check the scan maintenance preset counter. |

| S No. | Description | Function |
|---|---|---|
| 17 | ○ Used to display jam positions max. 100 times.<br>○ Used to display the total number of jam count. | • Jam position check<br>• Jam total count check |

When a jam occurs, the jam position is stored and the jam total counter counts up one.
However, jams of the initial jam check occurred when turning on the power are not counted.

(1) Jam position display

① Push C → 0 → 0 → C → 17 →COLOR PSW.

- The last jam number is displayed in the magnification ratio display.
- The jam position (code number) is displayed in the copy quantity display.
- The jam position code numbers are as shown in the table below:

| Code No. | Jam position | Remark |
|---|---|---|
| 1 | The manual paper pass detector (PPD1) does not turn on (does not detect paper). | Manual paper feed |
| 2 | The paper pass detector (PPD2) in front of the resist roller does not turne on (does not detect paper). | Manual paper feed |
| 3 | The paper pass detector (PPD2) in front of the resist roller does not turne on (does not detect paper). | Cassette paper feed |
| 4 | The paper pass detector (PPD2) in front of the resist roller does not turn off (does not detect paper). | Manual paper feed,<br>cassette paper feed |
| 5 | The paper separation detector (PSD) does not turn on (does not detect paper). | Manual paper feed,<br>cassette paper feed |
| 6 | The paper separation detector (PSD) does not turn off (does not detect paper pass). | Manual paper feed,<br>cassette paper feed |
| 7 | The paper-out detector (POD) does not turn on (does not detect paper). | Manual paper feed,<br>cassette paper feed |
| 8 | The paper-out detector (POD) does not turn off (does not detect paper pass). | Manual paper feed,<br>cassette paper feed |

② Use the zoom key to change the jam number up and down in the magnification ratio display, and the corresponding jam position code number is displayed

(Note) The code numbers are from 1 to 100. The greater number means the more recent jam.

<Zoom up key> Jam code 1 → 2 → 3 → ····· → 98 → 99 → 100

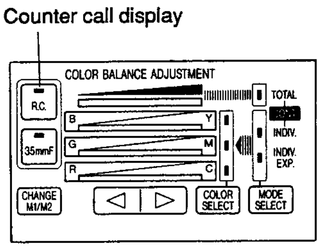
<Zoom down key> Jam code 1 ← 2 ← 3 ← ····· ← 98 ← 99 ← 100

When, however, jam count is 0, the jam code "00" is displayed in the magnification display. In this case, the zoom up key and the zoom down key are not effective.
When the last jam code is smaller than 100, the jam code display is changed with the last jam code as the maximum.

(2) Jam total counter recall

① Push C → 0 → 0 → C → 17 →COLOR PSW.

- The counter call display blinks in the color adjustment panel.

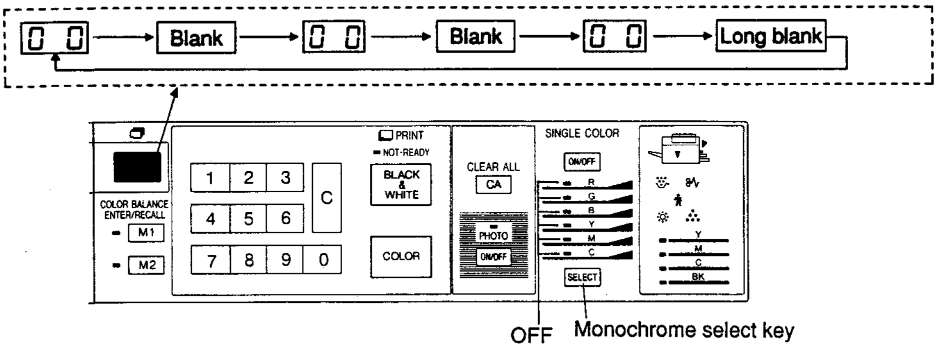
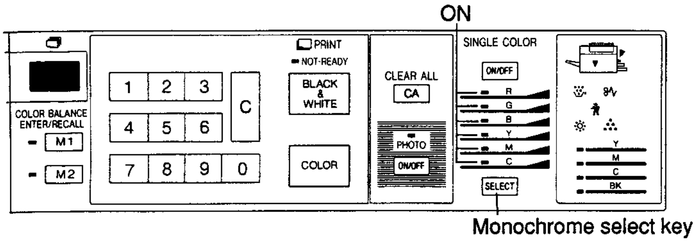
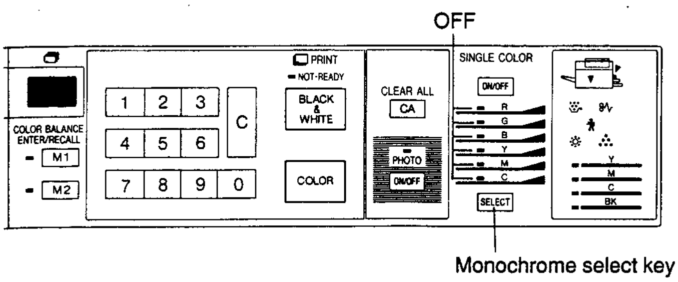


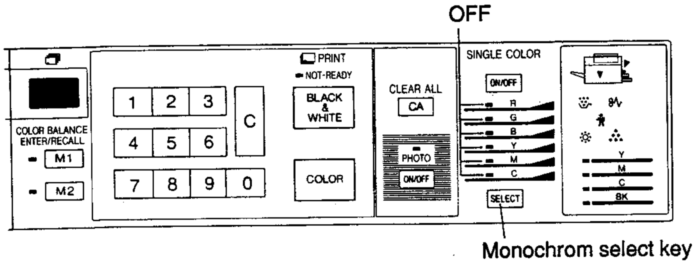
② Push the counter call key.

- The counter call display lights up, and the total number of jams is displayed in the copy quantity display.
(The total number is displayed in 2 digits x 3 times similarly as test command 16.)

③ Push the counter call key again.

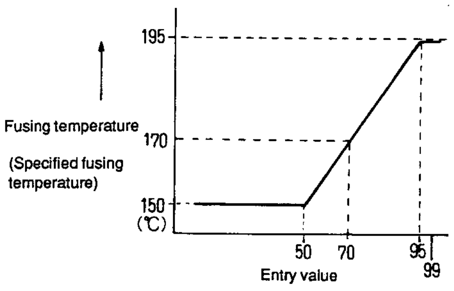
- The counter call display blinks and the mode returns to the jam position display mode.

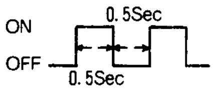
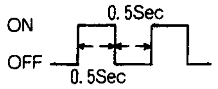
| S No. | Description | Function |
|---|---|---|
| 19 | ○ Used to display the copy maintenance counter reading.<br>○ Used to check the scan maintenance counter.<br>Push C → 0 → 0 → C → 1 → 9 → COLOR PSW and do the following to select the subitem.<br>(1) To display the copy maintenance counter reading<br>① Turn off all the monochrome indicators using the monochrome select key.<br>② Push the COLOR PSW.<br>• The copy maintenance preset counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br>• If the counter reading is above 10000, the maintenance indicator blinks. (When the main PWB DIP switch No. 8 is ON.)<br> 0 0<br>Blank<br>0 0<br>Blank<br>0 0<br>Long blank<br>PRINT<br>NOT-READY<br>1 2 3 4 5 6 7 8 9 0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R G B Y M C<br>SELECT<br>Y M C BK<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>OFF<br>Monochrome select key<br>(2) To display the scan maintenance counter reading<br>① Turn on all monochrome indicators using the monochrome select key.<br>② Push the COLOR PSW.<br>• The scan maintenance preset counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br> ON<br>PRINT<br>NOT-READY<br>1 2 3 4 5 6 7 8 9 0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R G B Y M C<br>SELECT<br>Y M C BK<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>Monochrome select key<br>• If the counter reading is above 20000, the maintenance indicator lights up. | • Used to check the copy maintenance counter.<br>• Used to display the scan maintenance counter reading.<br>• Use the monochrome select key to select the mode. |
| 20 | ○ Used to clear the copy maintenance counter. (The counter is reset to zero)<br>○ Used to clear the scan maintenance counter. (The counter is reset to zero)<br>Use the monochrome select key to select the mode.<br>Push C → 0 → 0 → C → 2 → 0 → COLOR PSW and do the following to select the subitem.<br>(1) To clear the copy number maintenance counter<br>① Turn off all the monochrome indicators using the monochrome select key.<br>② Push the COLOR PSW.<br>• The copy maintenance counter is cleared to zero.<br>• The copy maintenance preset counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br> OFF<br>PRINT<br>NOT-READY<br>1 2 3 4 5 6 7 8 9 0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R G B Y M C<br>SELECT<br>Y M C BK<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>Monochrome select key | • Used to clear the copy maintenance counter.<br>• Used to clear the scan maintenance counter. |

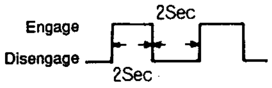
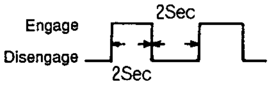
| S No. | Description | Function |
|---|---|---|
| 20 | (2) To clear the scan maintenance counter<br>① Turn off all the monochrome indicators using the monochrome select key.<br>② Push the COLOR PSW.<br>• The scan maintenance counter is cleared to zero.<br>• The scan maintenance preset counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br> OFF<br>PRINT<br>NOT-READY<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>0<br>C<br>BLACK & WHITE<br>COLOR<br>CLEAR ALL<br>CA<br>PHOTO<br>ON/OFF<br>SINGLE COLOR<br>ON/OFF<br>R<br>G<br>B<br>Y<br>M<br>C<br>SELECT<br>Y<br>M<br>C<br>BK<br>Monochrom select key | |
| 21 | o Used to check the warmup time.<br>o Used to evoke the multicopy function.<br>Push C → 0 → 0 → C → 2 → 1 → COLOR PSW the machine does the following.<br>• As the machine goes into the warm-up mode the counter increments one every five seconds and the counter number is displayed in the copy quantity indicator.<br>• After the warm-up has been completed, counting is suspended and the copy ready lamp comes on. You can obtain the time required for the warm-up based on the counter value.<br>(Warm-up time (sec) = counter value x 5)<br>• The multicopy mode is established.<br>(1) To do multicopy operation<br>Do the following command entry after the completion of the warm-up.<br>① Push the CLEAR key.<br>• The warm-up counter value is cleared and "0" is displayed in the copy quantity indicator.<br>② Enter the copy number on the numeric keypad.<br>• The copy number is displayed in the copy quantity dispaly.<br>③ Push the COLOR PSW or B/W PSW.<br>• Number of copied entered in (2) are produced in the multicopy mode.<br>NOTES:<br>• To cancel this test function, one of the following procedures must be performed.<br>① Push C → 0 → 0 → C.<br>② Turn off the power switch.<br>• As a general practice, do the above operations to cancel the functions evoked by the test command. Otherwise, the machine will operate in the multicopy mode thereafter. | • Used to check the warm-up time.<br>• Used to check the operation.<br>• Used to perform the copy aging test. |
| 22 | o Used to check the warmup time.<br>o Used to evoke the multicopy function.<br>Push C → 0 → 0 → C → 2 → 1 → COLOR PSW and the machine does the following.<br>• As the machine goes into the warm-up mode and the counter increments one at every five seconds and the counter number is displayed in the copy quantity indicator.<br>• After the warm-up has been completed, counting is suspended and the copy ready lamp comes on. You can obtain the time required for the warm-up based on the counter value.<br>(Warm-up time (sec) = counter value x 5)<br>• The multicopy mode without misfeed detection is established.<br>It is also possible to perform the multicopy operation without feeding paper. | • Used to check the warm-up time.<br>• Used to perform the aging test in the multicopy mode without feeding paper.<br>• Used to check the copy operation. |

| S No. | Description | Function |
|---|---|---|
| 22 | (1) To do multicopy operation<br>Do the same procedure as in the test command 21.<br>NOTES:<br>• To cancel this test function, one of the following procedures must be performed.<br>① Push C → 0 → 0 → C.<br>② Turn off the power switch.<br>• As a general practice, do the above operations to cancel the functions evoked by the test command. Otherwise, the machine will operate in the multicopy mode without paper thereafter. | |
| 23 | Used to set the continuous multiple copy operation without the fuser section temperature control (without warming up) and disregarding misfeed detection. | • Used to perform the multicopy aging test without paper.<br>• Used to check the copy operation except for the fuser temperature control.<br>• Used to check electrical circuits under fuser (Fuser removed.) |
| | Used to do multicopy operation without fuser temperature control function (warm-up) and disregarding misfeed detection.<br>(1) To perform the multicopy operation<br>Use the same procedure as test command 21 to do this test function.<br>NOTES: • Because the fuser temperature is not controlled (warm-up disabled), an improper fusing result may be encountered.<br>• Problem status (H2, H3, H4 fuser temperature control problem) is not diagnosed.<br>• To cancel this test function, one of the following procedures must be performed.<br>① Push C → 0 → 0 → C.<br>② Turn off the power switch.<br>• As a general practice, do the above operations to cancel the functions evoked by the test command. Otherwise, the machine will operate in the multicopy mode without paper thereafter. | |
| 24 | ○ Used to disable the warmup function.<br>○ Used to evoke test command without the misfeed check function. | • Used to perform the multicopy aging test.<br>• Used to do test function without warming up. |
| | (1) To do test function without warm-up (fuser temperature control)<br>① Push C → 0 → 0 → C → 2 → 4 → COLOR PSW.<br>• The warm-up function is disabled, hereinafter.<br>• A number in the copy quantity indicator goes out and the machine becomes ready for acceptance of another test command number.<br>② Type a test command number on the keypad.<br>• The test command is displayed in the copy quantity indicator.<br>③ Push the COLOR PSW.<br>• Starts the selected test function.<br>• To do another test function after the above, push the CLEAR key, enter the test command number, then push the COLOR PSW.<br>NOTES: • Because the fuser temperature is not controlled (warm-up disabled), an improper fusing result may be encountered if a copy is made after this test function.<br>• Problem status (H2, H3, H4 fuser temperature control problem) may possibly occur.<br>• When the test command 21 or 22 is executed after this test function, the test in this mode will be canceled.<br>• To cancel this test function, one of the following procedures must be performed.<br>① Push C → 0 → 0 → C.<br>② Turn off the power switch.<br>③ Test command 21 or 22.<br>• As a general practice, do the above operations to cancel the functions evoked by the test command.<br>Otherwise, improper fusing may be encountered because the warm-up function is disabled in the normal copy mode, thereafter. | |

| S No. | Description | Function |
|---|---|---|
| 25 | o Used to activate drive systems<br>o Used to adjust toner concentration.<br>Used to adjust the toner concentration and to check action of rotating parts.<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 2 → 5 → COLOR PSW and do the following to select the subitem.<br>(1) To adjust the toner concentration<br>① Checks if all the developer cartridges are installed.<br>• When all the developer cartridges are installed, the MISFEED indicator turns on.<br>• If only the black developer cartridge is installed, the WASTE TONER FULL indicator turns on.<br>② Type "1".<br>• "1" is displayed in the copy quantity indicator.<br>③ Select the kind of the cartridge whose toner concentration should be adjusted, using the cassette size select key.<br>• The DEVELOPER indicator of the selected developer cartridge turns on.<br>④ Push the COLOR PSW.<br>• The PC belt and TX belt, start turning and the developing bias turns on.<br>• Developer and toner are stirred for a period of two minutes. You can check the state of the developer cartridge shutter on the monochrome indicator. (The shutter opens and closes twice.)<br>Shutter open: Monochrome color display lamp ON<br>Shutter close: Monochrome color display lamp OFF<br>The monochrome color display lamp corresponding to the developer unit whose toner density is being adjusted lights up. After stirring developer and toner, the sensor is monitored for 16 times (every 300ms) and the average value is stored as the toner density adjustment value.<br>(2) To activate the drive systems.<br>① Type "2".<br>• "2" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The fuser lubrication roller turns on and off.<br>• The motors turn on.<br>• The maintenance indicator turns on when the PC belt index detector (PBHPS) detected the index.<br>• The developer indicator turns on when the TX belt index detector (TBHPS) detected the index.<br>NOTE: • If this test has to be executed continuously, unfasten the fuser lubricator solenoid (FOS). Otherwise, too much oil is applied to the roller. When the rotation parts are checked after toner density adjustment, the toner density adjustment value is changed. Therefore the toner density adjustment value must be memorized with test command 59 before checking the rotation parts. After checking, restore the value to the original value.<br>If a numeric key "1" or "2" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection. | • Used to check the rotating parts and their control circuits.<br>• Used to adjust the toner concentration.<br>• Used to check the PC belt index detector (PBHPS) and its circuit.<br>• Used to check the TX belt index detector (TBHPS) and its circuit. |
| 26 | o The lens base will move and pause at each position of magnification ratio.<br>When the lens base moves to the preset appropriate to the fixed magnification, it stops there for a period of one second.<br>The copy magnification ratio relevant to the lens base position is displayed in the copy magnification indicator.<br>AB series x 1.0 → x 0.81 → x 0.70 → x 1.41 → x 1.22 → x 1.00<br>Inch series x 1.00 → x 0.77 → x 0.64 → x 1.29 → x 1.21 → x 1.00 | • Used to check the movement of the lens base.<br>• Used to check the lens base drive motor (LM) and its control circuit. |

| S No. | Description | Function |
|---|---|---|
| 27 | ○ The lens base will move and pause at each position of preset magnification ratio continuously.<br>The lens base will move and pause at each position of magnification ratio, and repeat the same action in this case.<br>AB series → × 1.0 → × 0.81 → × 0.70 → × 1.41 → × 1.22 → × 1.00<br>Inch series → × 1.00 → × 0.77 → × 0.64 → × 1.29 → × 1.21 → × 1.0 | • Used to do the burn-in test of the lens base.<br>• Used to check action of the lens base.<br>• Used to check the lens base drive motor (LM) and its control circuit. |
| 28 | ○ Displays the fusing temperature selected setting.<br>○ Used to set the fuser temperature to any degree.<br>Push C → 0 → 0 → C → 2 → 8 → COLOR PSW, then two digits of the fuser temperature setting are displayed in the copy quantity dispaly.<br>(Ex): If the value in display is 80, the temperature setting is 180°C, which is the basic setting for this machine.<br>(Reference):<br>(1) To program the fusing temperature<br>① Type low order two digits of the temperature to be set.<br>• The setting will then be displayed in the copy quantity indicator, only last two digits.<br>② Push the COLOR PSW.<br>• With this, the value entered in ① is stored.<br>• Then, the control goes ready for receiving of the test command number.<br>The setting can be entered in increments of 5°C.<br>Entry of a number other than a multiple of 5, it will be truncated.<br>(Ex): Entry of 68 will set the temperature to 165°C.<br>NOTES: • Since this test command has been provided for development, it should never be changed to other than 180°C.<br>• It has the maximum temperature limit of 195°C and the minimum limit of 150°C, so that it is not possible to set the temperature out of the limits.<br> <br>The status U2 is canceled when the fuser temperature automatically set to 180°C. | • Used to check the fusing temperature setting |
| 29 | ○ The machine assumes as if the developer unit is installed.<br>○ Used to simulate an undertone condition. | • Used to check the developer drive mechanism. |
|  | By simulating the installation of the developer cartridges, the copy operation can be performed without using the developer cartridge.<br>In addition, by simulating an undertone condition for the developer cartridge, you can run the toner motor disregarding the toner concentration. In order words, the copy operation takes place under the undertoner condition.<br>The developer cartridge installation can be simulated for any developer cartridge. And, it is also possible to do another test function with this function active.<br>Push C → 0 → 0 → C → 2 → 9 → COLOR PSW and do the following to select the subitem. | • Used to check the toner motor (TM) and its control circuit.<br>• Used to check the developer mix clutch (DMC) and its control circuit.<br>• Used to check the MG roller clutch (DMGC) and its control circuit. |

| S No. | Description | Function |
|---|---|---|
| 29 | (1) To simulate the developer cartridge installation<br>① Using the paper size select key, choose the developer cartridge for which the installation is to be simulated.<br>• Each time the paper size select key is pushed, developer cartridges will be selected with the developer indicator of the respective cartridge in activation.<br>② Set in the undertone condition<br>a. To set it undertoned at all times (to run the toner motor during the copy operation)<br>① Type "1".<br>• "1" is displayed in the copy quantity dispaly.<br>b. To set it undertoned only when the COLOR PSW is pushed (to run the toner motor only while the COLOR PSW is depressed during the copy operation)<br>① Type "2".<br>• "2" is displayed in the copy quantity indicator.<br>③ Push the COLOR PSW.<br>• The developer cartridge selected in ① is set in the installed state in the undertoned condition.<br>To set all the developer cartridges to the above conditions, repeat ① through ③ for all the developer cartridges.<br>• Developer indicator of the relevant cartridge will activate if simulated.<br>(2) To do another simulation with the above functions in effect (without installing developer cartridge)<br>① After (1) was done, push the CLEAR key.<br>• A number in the copy quantity indicator disappears and becomes ready to receive a test command number.<br>② Type the test command number to be executed.<br>• The test command entered appears in the copy quantity indicator.<br>③ Push the COLOR PSW.<br>The simulation relevant to the chosen test command selected in ② will start.<br>NOTES: • To cancel this test function, one of the following procedures must be performed.<br>① Push C → 0 → 0 → C.<br>② Turn off the power switch.<br>• As a general practice, do the above operations to cancel the functions evoked by the test command.<br>• Never try to install any developer cartridge while this test function is alive. Otherwise, toner will be supplied unconditionally and an overtoned condition will therefore be evoked. |  |
| 37 | ○ Used to turn on and off the TX belt cleaner.<br>○ Used to turn on and off the PC belt.<br>○ Used to apply toner on the PC belt.<br>○ Used to turn on/off the TX belt TB cleaning roller.<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 3 → 7 → COLOR PSW and do the following to select the subitem.<br>(1) To turn on and off the TX belt cleaner<br>① Type "1".<br>• "1" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The TX belt cleaner turns on and off as shown below.<br> <br>(2) To turn on and off the PC belt cleaner<br>① Type "2".<br>• "2" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The PC belt cleaner turns on and off as shown below.<br> | • Used to check the TX belt cleaner, TX belt TB cleaning roller and their control circuit.<br>• Used to check the PC belt cleaner and its control circuit.<br>• Used to abate friction in the PC belt when replacing the PC cleaning blade. |

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>37</td><td>(3) To apply toner on the PC belt<br>① Type "3".<br>• "3" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The TX roller tension is released.<br>• If the black developer cartridge is installed, the black toner is applied all over the PC belt. If the black developer cartridge is not installed, the yellow toner is applied all over the PC belt.<br>NOTES: • If none of developer cartridges is installed, the blinking problem status CH is displayed.<br>• If moved to this test function from the test command 29 to do the above (3), the toner may not sometimes applied over the PC belt.<br>If a numeric key "1", "2", or "3" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td></td></tr>
<tr><td>39</td><td>○ The copying operation takes place without issuing the secondary TX voltage (PTHV).<br>○ Used to cause the TX roller to engage and disengage while the TX belt is rotating without the secondary TX voltage (PTHV) output.<br>○ Used to cause the secondary TX roller to engage and disengage while the TX belt is stopped without the secondary TX voltage (PTHV).<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 3 → 9 → COLOR PSW and do the following to select the subitem.<br>(1) To do the copy operation without the secondary TX voltage (PTHV) issued.<br>(Used to check the balance of the secondary TX roller tension.)<br>① Type "1".<br>• "1" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• Copy operation is performed without issuing the secondary TX voltage (PTHV).<br>(2) To have the secondary TX roller engage and disengage with the TX belt rotating<br>① Type "2".<br>• "2" is displayed in the copy quantity indicator.<br>② Select the TX speed using the paper size select key.<br>• The selected TX speed is indicated on the developer indicator.<br>• The developer indicator relevant to the selected TX speed turns on.
<table>
<tr><th>TX speed</th><th>Indicator (developer indicator)</th></tr>
<tr><td>184mm/Sec</td><td>Yellow</td></tr>
<tr><td>115mm/ ec</td><td>Magenta</td></tr>
<tr><td>60mm/Sec</td><td>Cyan</td></tr>
</table>
③ Push the COLOR PSW.<br>• The TX belt rotates by the TX speed selected in ②.<br>• The TX roller engages and disengages at every 2 seconds.<br> <br>• When the secondary TX roller position detector (TRPD) detects that the secondary TX roller is engaging, the developer indicator turns on.<br>(3) To engage and disengage the TX roller with the TX belt at stop<br>① Type "3".<br>• "3" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br> <br>• When the TX roller position detector (TRPD) detects that the TX roller is engaging, the developer indicator turns on.<br>If a numeric key "1", "2", or "3" is pushed during the test operation, the test operation is halted and the machine goes into the standby state for the operation mode selection.</td><td>• Used to check the TX roller tension and balance.<br>• Used to check the TX roller to engage and disengage and its control circuit.<br>• Used to check the transfer clutch operation.</td></tr>
</table>

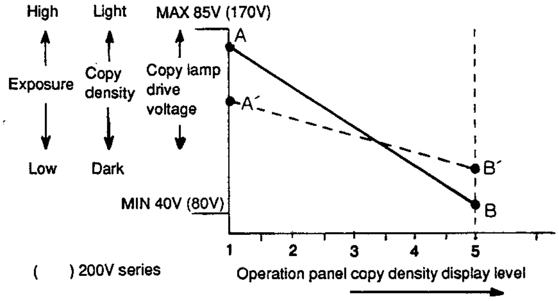
<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>40</td><td>○ Used to display the developer preset counter reading.<br><br>Push C → 0 → 0 → C → 4 → 0 → COLOR PSW to do the following.<br>① Select the developer kind using the paper size select key.<br>The kind of developer preset counter is displayed by the developer indicator.<br>• The developer indicator of the selected developer turns on.<br>② Push the COLOR PSW.<br>• The selected developer preset counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br>0 1 → Blank → 0 0 → Blank → 0 0 → Long blank<br><br>
<table>
<tr><th>Kind of developer preset counter</th><th>Preset counter reading</th><th>Indicator (developer indicator)</th></tr>
<tr><td>Yellow</td><td>10000</td><td>Yellow</td></tr>
<tr><td>Magenta</td><td>10000</td><td>Magenta</td></tr>
<tr><td>Cyan</td><td>10000</td><td>Cyan</td></tr>
<tr><td>Black</td><td>20000</td><td>Black</td></tr>
</table>
<br>If the paper size select key is pushed while the developer preset counter reading is on the display, the control goes ready to select the developer kind.</td><td>• Used to check the developer preset counter reading.</td></tr>
<tr><td>41</td><td>○ The developer counter reading is displayed.<br><br>Push C → 0 → 0 → C → 4 → 1 → COLOR PSW to do the following.<br>① Select the developer kind using the paper size select key.<br>The kind of developer counter is displayed by the developer indicator. (The indicator lamps and developer kinds are similar as the test command 40.)<br>• The developer indicator of the selected developer turns on.<br>② Push the COLOR PSW.<br>• The selected developer counter reading is displayed in the copy quantity indicator in three divisions, two digits at a time.<br><br>0 0 → Blank → 0 0 → Blank → 0 0 → Long blank<br><br>If the paper size select key is pushed while the developer counter reading is on the display, the control goes ready to select the developer kind.</td><td>• Used to check the developer counter.</td></tr>
<tr><td>42</td><td>○ Used to clear the developer counter. (The counter is reset to zero.)<br><br>Push C → 0 → 0 → C → 4 → 2 → COLOR PSW to do the following.<br>① Select the developer kind using the paper size select key.<br>The kind of developer counter is displayed by the developer indicator. (Indicator lamps and developer kinds are similar as the test command 40.)<br>• The developer indicator of the selected developer turns on.<br>② Push the COLOR PSW.<br>• The selected developer counter reading in the copy quantity indicator is cleared in three divisions, two digits at a time.<br>• If the paper size select key is pushed while the developer preset counter reading is on the display, the control goes ready to select the developer kind.</td><td>• Used to clear the developer counter. (The counter is reset to zero.)</td></tr>
<tr><td>45</td><td>○ Used to program the PC belt sensitivity setting.<br><br>Push C → 0 → 0 → C → 4 → 5 → COLOR PSW to bring on the copy quantity indicator the sensitivity of the PC belt.<br>① Type the PC belt sensitivity on the numeric keypad using a number between 1 and 3.<br>• The sensitivity just entered is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• With this, the PC belt sensitivity is now stored in the memory.</td><td>• Used to set the PC belt sensitivity.</td></tr>
</table>

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>46</td><td>

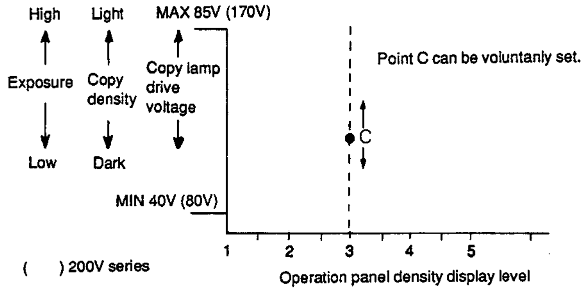
○ Used to adjust the copy quality (density) in the manual mode.<br>
(○ It is possible to set the copy density (exposure) slope and copy density (exposure) level in the manual graphic mode.<br>
(○ The copy density (exposure) level in the manual photo mode can be set.)<br>
<br>
By setting the copy density level 1 and copy density level 5 exposure rate (copy lamp drive voltage) in the manual graphic copy mode, it is possible to set the copy density (exposure) slope and the density (exposure) level.<br>
By setting to the exposure (the voltage applied to the copy lamp) quantity of copy density level 3 in the manual photo mode, the copy density level can be adjusted.<br>
For the full color mode, however, the exposure level (copy lamp drive voltage) for the copy density level "9" (low density (LD) area) and the copy density level "1" (high density (HD) area) can be set.<br>
With the above, you can adjust the copy quality in the manual photo mode.

<table>
<tr><th colspan="2" rowspan="2">Copy mode</th><th rowspan="2">Color</th><th colspan="3">Copy density level</th><th rowspan="2">Front panel monochrome status lamp in test command 46</th></tr>
<tr><th>1</th><th>3</th><th>5</th></tr>
<tr><td rowspan="6">Full color</td><td rowspan="3">GR</td><td>Y</td><td>☆</td><td>—</td><td>☆</td><td>Yellow ON</td></tr>
<tr><td>M</td><td>☆</td><td>—</td><td>☆</td><td>Magenta ON</td></tr>
<tr><td>C</td><td>☆</td><td>—</td><td>☆</td><td>Cyan ON</td></tr>
<tr><td rowspan="3">PH</td><td>Y</td><td>—</td><td>☆</td><td>—</td><td>Yellow ON</td></tr>
<tr><td>M</td><td>—</td><td>☆</td><td>—</td><td>Magenta ON</td></tr>
<tr><td>C</td><td>—</td><td>☆</td><td>—</td><td>Cyan ON</td></tr>
<tr><td rowspan="2">Monochrome</td><td>GR</td><td>M</td><td>☆</td><td>—</td><td>☆</td><td>Yellow, magenta, cyan ON</td></tr>
<tr><td>PH</td><td>M</td><td>—</td><td>☆</td><td>—</td><td>Yellow, magenta, cyan ON</td></tr>
<tr><td rowspan="2">Black-white</td><td>GR</td><td>BK</td><td>☆</td><td>—</td><td>☆</td><td>All monochrome lamps ON</td></tr>
<tr><td>PH</td><td>BK</td><td>—</td><td>☆</td><td>—</td><td>All monochrome lamps ON</td></tr>
</table>

In the full color PH mode, Y, M, and C can be simultaneously adjusted by checking the color balance.<br>
(Graphic mode)<br>
☆ Copy density level (exposure (copy lamp drive voltage)) and operation block copy density display level.

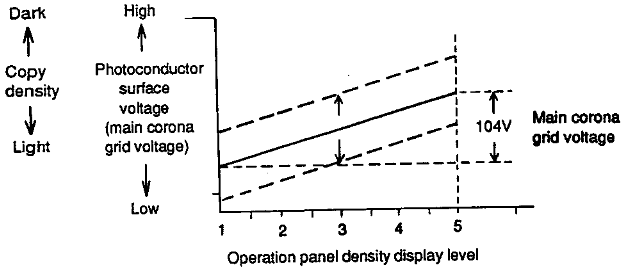


By setting the exposure rate at point A of the copy density I exposure (copy lamp drive voltage) and the rate at point B of the copy density level 5 (copy lamp drive voltage), the exposure slope (copy density slope) and the exposure level (copy density) are set.<br>
A – B characteristics – exposure slope (copy density slope): high<br>
A' – B characteristics – exposure slope (copy density slope): low<br>
Points A and B can be set as you want.<br>
(Photo mode)<br>
☆ Copy density level (exposure (copy lamp drive voltage)) and the operation panel density display level.

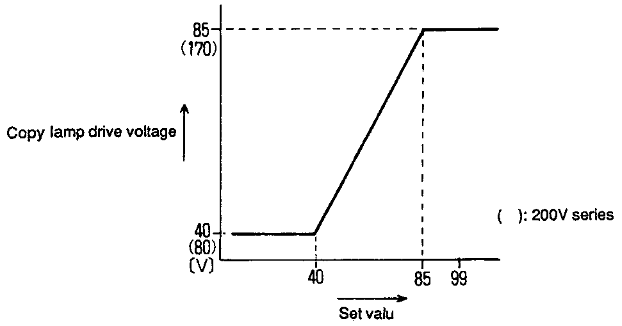
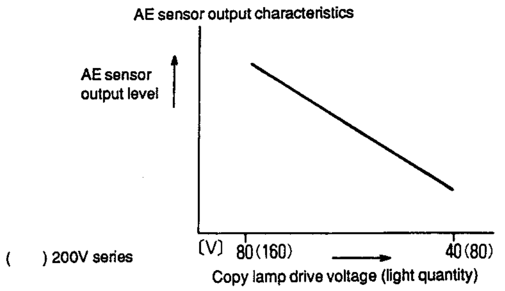


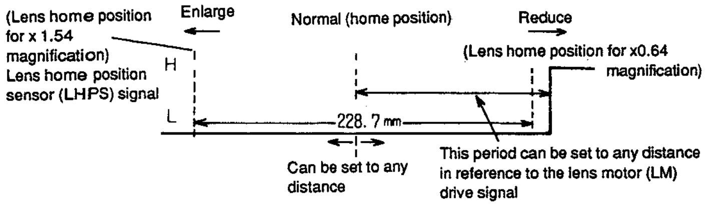
• Point C can be arbitrarily set. (With the copy density slope kept constant, the copy density level can be arbitrarily set.)

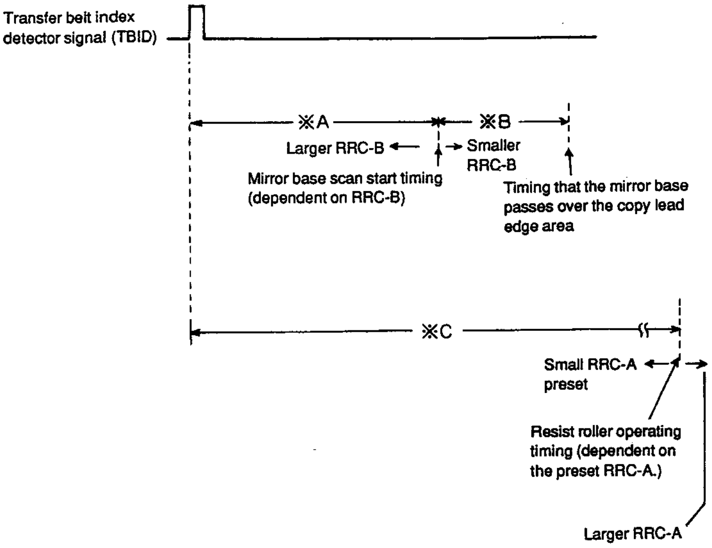
</td><td>• Used to adjust the copy quality in the manual copy mode.</td></tr>
</table>

| S No. | Description | Function |
|---|---|---|
| 46 | (Reference)<br>To adjust the photo mode copy density, the exposure level (copy lamp drive voltage) is not changed but the PC surface voltage (main corona grid voltage) is changed. Therefore the copy density slope is kept constant.<br>☆ Copy density (PC surface voltage (main corona grid voltage)) and operation panel density display level.<br> <br>The characteristics vary according to the value set by test command 46.<br>Setup of copy density (exposure) slope and the copy density (exposure/PC surface voltage) level comprise the basic for the preset auto mode and auto exposure mode.<br>Push C → 0 → 0 → C → 4 → 6 → COLOR PSW to do the following.<br>(Graphic mode)<br>① Select the graphic mode by pushing the auto/manual select key and the photo/graphic select key.<br>② Select the adjustment mode with the monochrome select key.<br>• You can check the copy mode on the monochrome indicator. For the full color adjustment mode, you can set the copy density (exposure slope) and copy density (exposure level) for any color of yellow, magenta, and cyan, independently.<br>③ Set the copy density to 1 using the copy density level adjust key.<br>• The value entered appears in the copy quantity indicator.<br>④ Type a number between 1 and 99 on the numeric keypad.<br>• The value entered appears in the copy quantity indicator.<br>⑤ Push the COLOR PSW.<br>• The exposure rate (copy lamp drive voltage) set for the preset (copy density level 1) entered in ④ is now set.<br>• Produces a copy with the density respective to the exposure rate (copy lamp drive voltage) set for the preset (copy density level 1) entered in ④.<br>⑥ Set the exposure level 5 using the copy density level adjust key on the operation panel.<br>• The preset in memory is displayed in the copy quantity indicator.<br>⑦ Type the preset on the keypad using a number between 1 and 99.<br>• The value entered appears in the copy quantity indicator.<br>⑧ Push the COLOR PSW.<br>• The exposure rate (copy lamp drive voltage) set for the preset (copy density level 5) entered in ⑦ is now set.<br>• Produces a copy with the density respective to the exposure rate (copy lamp drive voltage) set for the preset (copy density level 5) entered in ⑦.<br>• The exposure slope (copy density slope) selected in ① and ② and the exposure level (copy density level) are set.<br>Repeat above steps ① to ⑧ for each mode.<br>(Photo mode)<br>There are two ways of full color photo mode adjustment<br>• Select yellow, magenta, or cyan with the monochrome copy select key, and the copy density (exposure) grade and the copy density (exposure) level can be independently set in the high density (HD) area and the low density (LD) area.<br>• After execution of the automatic exposure adjustment, make a full color copy to check the color balance, and yellow, magenta, and cyan color can be adjusted with the color adjust key in the high density (HD) area and the low density (LD) area.<br>Independent adjustment of full color photo mode yellow, magenta, or cyan<br>① Select the photo mode. Turn off the auto mode with the auto/manual select key.<br>• The operation panel copy density (exposure) level is set to "5." The low density (LD) area is set. |  |

| S No. | Description | Function |
|---|---|---|
| 46 | ② Select the adjustment mode.<br>• The adjustment mode can be monitored with the monochrome copy lamp.<br>In the case of the full color adjustment mode, independent adjustment of copy density (exposure) level for yellow, magenta, and cyan can be made.<br>• The value set in the copy quantity display is displayed.<br>③ Enter the set value (1 – 99) with the numeric key.<br>• The entered value is displayed in the copy quantity display.<br>④ Push the COLOR PSW.<br>• The screen is set.<br>• The value entered in procedure ③ which is the exposure level (copy lamp drive voltage) at copy density level "5" is set.<br>• A copy according to the value entered in procedure ③ which is the exposure level (copy lamp drive voltage) at copy density level "5" is produced.<br>Repeat procedures ① to ④ for each mode.<br>⑤ Push the LIGHT key.<br>• The operation panel copy density (exposure) level is set to "1." The high density (HD) area image area is set.<br>⑥ Select the adjustment mode.<br>• The adjustment mode can be monitored with the monochrome copy lamp.<br>In the case of the full color adjustment mode, independent adjustment of copy density (exposure) level can be made for yellow, magenta, and cyan.<br>• The value set in the copy quantity display is displayed.<br>⑦ Enter the set value (1 – 99) with the numeric key.<br>• The entered value is displayed in the copy quantity display.<br>⑧ Push the COLOR PSW.<br>• The value set in procedure ⑦ which is the exposure level (copy lamp drive voltage) at copy density level "1" is set.<br>• A copy according to the value set in procedure ⑦ which is the exposure level (copy lamp drive voltage) at copy density level "1" is produced.<br>Repeat procedures ⑤ through ⑧ for each mode.<br>Adjustment while checking the full color photo mode color balance<br>① Check that there is nothing on the document table, and close the document cover. Check that the auto exposure mode is set.<br>② Push the COLOR PSW.<br>• The automatic exposure adjustment mode is selected.<br>(The toner concentration on the PC/TX belts is read by the gamma sensor to determine the optimum exposure voltage.)<br>③ Cancel the automatic exposure adjustment mode.<br>• The operation panel copy density (exposure) level is set to "5." (The low density (LD) area is set.)<br>④ Confirm the adjustment mode.<br>• The adjustment mode can be monitored with the monochrome copy lamp. (The red, green, and blue lamps light up.)<br>⑤ Set the gray scale on the document table, and push the COLOR PSW.<br>• The screen is set.<br>• A full color LD copy which is almost similar to the standard copy with overlapped yellow, magenta, and cyan is produced, and the copy density (copy lamp drive voltage) for yellow, magenta, and cyan is set.<br>⑥ Adjust the exposure level of each color with the color adjust key to obtain proper color balance.<br>⑦ Push the color PSW.<br>• Screen is set.<br>• The value entered in procedure ⑥ is set.<br>• A copy according to the value entered in procedure ⑥ is produced.<br>⑧ Push the LIGHT key.<br>• The operation panel copy density (exposure) level is set to "1." The high density (HD) area image area is set.<br>⑨ Push the COLOR PSW.<br>• A full color HD copy with overlapped yellow, magenta, and cyan is produced, and the copy density (copy lamp drive voltage) of yellow, magenta, and cyan is set.<br>⑩ Adjust the exposure level of each color with the color adjust key to obtain proper color balance. | |

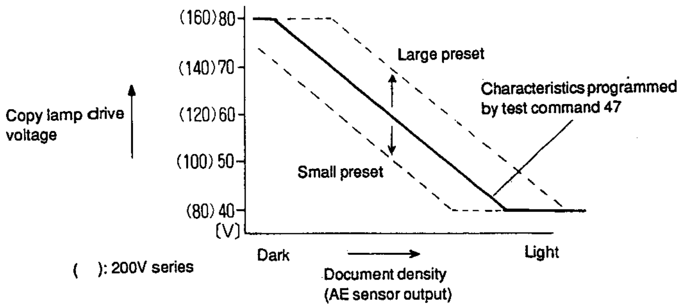
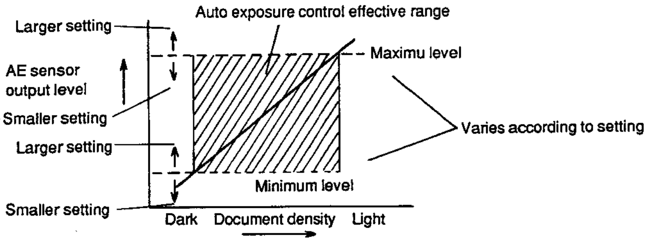
| S No. | Description | Function |
|---|---|---|
| 46 | ⑪ Push the color PSW.<br>The value entered in procedure ⑩ is set.<br>A copy according to the value entered in procedure ⑩, is produced.<br>**Monochrome, black/white photo mode**<br>① Select the photo mode.<br>- The copy density level is set to 3.<br>- The screen is set.<br>② Select the adjustment mode.<br>- The copy mode can be monitored with the monochrome copy lamps. In the case of the full color copy mode, the copy density (exposure) level can be independently set for each of Yellow, Magenta, and Cyan.<br>- The preset value is displayed on the copy quantity indicator.<br>③ Enter the set value (figures from 1 to 99) with numeric keys.<br>- The entered value is displayed on the copy quantity indicator.<br>④ Push the COLOR PSW.<br>- The screen is set.<br>- The exposure quantity (the copy lamp drive voltage) entered in procedure ③ under the copy density level 3.<br>- A copy of density corresponding to the exposure quantity (the copy lamp drive voltage) entered in procedure ③ under the copy density level 3.<br>Perform procedures ① through ④ for each mode.<br>When a copy is made in the full color copy mode established in this test function, a monochrome copy exposed by one of filters (R, G, B) is produced, respective to the assigned color.<br>In the monochrome copy mode in this test function, only a magenta copy can be produced.<br>Higher the set value is, higher the copy lamp drive voltage is supplied.<br>Lower the set value is, lower the copy lamp drive voltage is supplied.<br>Changing the set value by one increment changes the copy lamp drive voltage by 0.5V (1V).<br>Even if the set value was set above 85 or below 40, the copy lamp drive voltage may not go above 40V (80V) or 85V (170V).<br> |  |
| 47 | ○ Used to store the AE sensor output characteristics in the memory.<br>The copy lamp drive voltage changes from 80V to 40V in increment of 5V. The AE sensor output characteristics is stored according to the change in the copy lamp drive voltage (lamp intensity).<br> <br>The copy lamp drive voltage in the black-and-white auto copy mode is determined on the basis of these characteristics. This is done in order to correct the light intensity received by the AE sensor.<br>When the test function has been successful, the number in the copy quantity dispaly disappears. | - Used to store the AE sensor output characteristics. |

| S No. | Description | Function |
|---|---|---|
| 47 | A sheet of white paper must be placed on the document table AE sensor measuring area for this test command. | |
| 48 | ○ Used to adjust the vartical copy magnification ratio. (The lens home position can be set to any desired position.)<br>The lens home position will be established using the lens motor drive signal pulses (LHPS), as started from the point where the lens home position sensor signal (LHPS) makes a high to low transition.<br> (Lens home position for x 1.54 magnification)<br>Enlarge<br>Normal (home position)<br>Reduce<br>(Lens home position for x0.64 magnification)<br>Lens home position sensor (LHPS) signal<br>H<br>L<br>228. 7 mm<br>Can be set to any distance<br>This period can be set to any distance in reference to the lens motor (LM) drive signal<br>By adjusting the lens home position, you can change the vartical magnification ratio.<br>The lens home position where the lens base is at the x1.0 normal position will be established using the lens motor (LM) drive signal, as started from the point where the lens home position sensor signal (LHPS) makes a high to low transition.<br>Push C → 0 → 0 → C → 4 → 8 → COLOR PSW, then the current preset is displayed in the copy quantity indicator.<br>(1) To set the lens home position (to change the vartical magnification ratio)<br>① Type a new preset on the keypad using a number between 1 and 99.<br>• The value entered appears in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The value entered in (1) is now set.<br>• The figure in the copy quantity indicator disappears and the control goes ready to accept a test command number.<br>(2) How the preset is calculated.<br>Vartical copy magnification ratio corrective factor<br>$= \frac{\text{longitudinal size of document (mm)} - \text{copy image size (mm)}}{\text{longitudinal size of document}}$<br>$\times 235\ 100 - 0.25$<br>Set value =<br>preset value + longitudinal copy magnification ratio corrective factor $\times 26.5$<br>(Fraction to be rounded)<br>Changing the set value by one changes the magnification ration by 0.04%.<br>Larger the set value is programmed, the lens home position shifts to the enlarge direction so that the copy is made under a larger vartical magnification.<br>Smaller the set value is programmed, the lens home position shifts to the reduce direction so that the copy is made under a smaller vartical magnification.<br>(The lens base moves 0.1mm per lens motor drive signal-1 pulse.) | • Used to adjust the vartical copy magnification ratio. |
| 49 | ○ Used to adjust the horizontal copy magnification ratio. (The mirror base scan speed can be set to any speed.)<br>The mirror base scan speed can be set to any speed respective to the copy magnification ratio.<br>By setting the mirror scan speed to any degree, the horizontal copy magnification ratio can be changed to any setting.<br>Push C → 0 → 0 → C → 4 → 9 → COLOR PSW, then the current preset is displayed in the copy quantity indicator.<br>(1) To set the mirror base scan speed (change the transverse magnification ratio)<br>① Type a new preset value on the keypad using a number between 1 and 99.<br>• The value entered appears in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The value entered in (1) is now set.<br>• The figure in the copy quantity indicator disappears and the control becomes ready to accept a test command number. | • Used to adjust the horizontal copy magnification ratio. |

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>49</td><td>
(2) How the set value is calculated.<br>
Transverse copy magnification ratio corrective factor<br>
$$= \frac{\text{transverse size of document (mm)} - \text{copy image size (mm)}}{\text{transverse size of document}} \times 100 + 0.25$$
Set value =<br>
preset value + transverse copy magnification ratio corrective factor × 10<br>
(Fraction to be rounded)<br>
Changing the set value by one changes the magnification ratio (mirror base scan speed) by 0.1%.<br>
Larger the set value is programmed, the mirror scan speed becomes slower so that the copy is made under a larger horizontal magnification.<br>
Smaller the set value is programmed, the mirror scan speed becomes faster so that the copy is made under a smaller horizontal magnification.<br>
Preset vs. horizontal copy magnification ratio (mirror base scan speed)<br>
Set value and mirror base scan speed
<table>
<tr><th>Set value<br>Copy magnification on display</th><th>1</th><th>50</th><th>99</th></tr>
<tr><td>64%</td><td>(302mm/Sec)</td><td>(288mm/Sec)</td><td>(274mm/Sec)</td></tr>
<tr><td>100%</td><td>(193mm/Sec)</td><td>(184mm/Sec)</td><td>(175mm/Sec)</td></tr>
<tr><td>154%</td><td>(162mm/Sec)</td><td>(120mm/Sec)</td><td>(114mm/Sec)</td></tr>
</table>
</td><td></td></tr>
<tr><td>50</td><td>
○ Used to adjust the copy lead edge deviation.<br>
(○ Copy image basic area on the TX belt can be set.)<br>
(○ The resist roller on timing can be set.)<br>
The copy lead edge reference position (image loss) depends on the mirror base scan start timing (copy image position on the TX belt) and the resist roller ON timing.<br>
The mirror base scan ON timing (copy image position on the TX belt) and the resist roller ON timing are determined by the timer with reference to the TX belt index position.<br>
Timer set time can be set with two modes of RRC-A and RRC-B in this test command.<br>

Transfer belt index detector signal (TBID)
※A
※B
Larger RRC-B
Smaller RRC-B
Mirror base scan start timing (dependent on RRC-B)
Timing that the mirror base passes over the copy lead edge area
※C
Small RRC-A preset
Resist roller operating timing (dependent on the preset RRC-A.)
Larger RRC-A

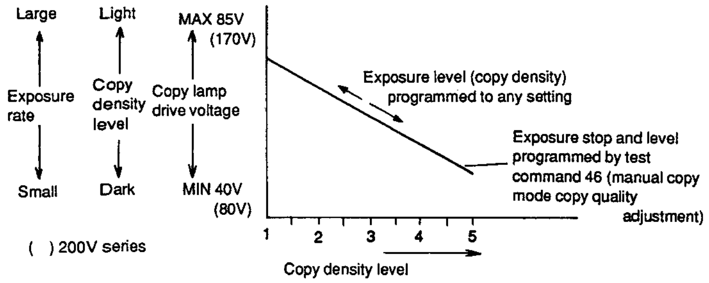
<br>
*A: Timer duration (Varies according to copy magnification ratio.)<br>
*B: Timer duration (Varies according to copy magnification ratio.)<br>
*C: Timer duration
</td><td>• (To adjust the copy image lead edge (image loss)</td></tr>
</table>

| S No. | Description | Function |
|---|---|---|
| 50 | (1) Setting procedure<br>Push C → 0 → 0 → C → 5 → 0 → COLOR PSW.<br>• Memory indicator M2 turns on<br>• Copy magnification ratio is 154%<br>• The current RRC-B value is displayed in the copy quantity indicato.<br>a. Programming the copy image location on the TX belt<br>① Push the memory key switch M2 to turn on the memory indicator M2.<br>• The memory indicator M2 turns on.<br>② Type a number for RRC-B on the numeric keypad using a number between 0 and 99.<br>• The RRC-B entered will appear in the copy quantity indicator.<br>③ Push the BLACK-WHITE PSW.<br>• The RRC-B entered in (2) is now stored in the memory.<br>• A copy is produced.<br>b. To program the resist roller ON timing<br>① Push the memory key switch M2 to turn off the memory indicator M2.<br>• The memory indicator M2 turns off.<br>• The current RRC-A value is displayed in the copy quantity indicator.<br>② Type a number for RRC-A on the numeric keypad using a number between 0 and 99.<br>• The RRC-A entered will appear in the copy quantity indicator.<br>③ Push the BLACK-WHITE PSW.<br>• The RRC-A entered in (2) is now stored in the memory.<br>• A copy is produced.<br>(2) How to obtain the preset value<br>$\text{RRC-A} = \frac{(1.54 \times LR) - (0.64 \times LE)}{0.18}$<br>$\text{RRC-B} = \frac{(LE - LR)}{0.18}$<br>Where,<br>LE: Distance between the paper lead edge and the copy image lead edge (mm) for 154% mode when the RRC-A and RRC-B presets are 0.<br>LR: Distance between the paper lead edge and the copy image lead edge (mm) for 64% mode when the RRC-A and RRC-B presets are 0.<br>If RRC-B was not appropriate, copy image location variation increases proportionate to the copy magnification ratio.<br>If the RRC-A was too large, the resist roller ON timing (paper TX timing) delays so that it results in a larger copy lead edge image loss.<br>If the RRC-A was too small, the resist roller ON timing (paper TX timing) advances so that it results in a larger copy lead edge image loss.<br>• In this test operation, when the photo mode lamp is lighted with the photo mode key, the control moves to the test command 58.<br>• Varying RRC-A by 1 varies the resist roller ON timing (paper TX timing) by 0.2mm.<br>• When the PSW is pushed using the cRC ounter key and the PSW is pushed, five copies are produced in the multicopy mode.<br>• When the enlarge key is pushed, the control is set to the copy magnification ratio of 154%. Or, when the reduce key is pushed, the control is then set to the copy magnification ratio of 64%.<br>• When this test function has been executed, the preset for the test function 58 resets to the state of 0 (blank lamp off timing being the fastest). | |
| 51 | ○ Used to adjust the copy quality (copy density) in the auto black/white graphic mode. (○ The copy drive voltage characteristics can be changed to any degree relative to the document density (AE sensor output).<br>The copy lamp drive voltage characteristics will be determined relative to the document density (AE sensor output) based on the AE sensor output characteristics stored in the memory programmed by the test function 47.<br>The copy lamp drive voltage characteristics can be changed relative to the document density (AE sensor output).<br>By changing the copy lamp drive voltage relative to the document density (AE sensor output), the copy density can be adjusted for the black/white graphic auto mode.<br>(Document density (AE sensor output) vs. copy lamp drive voltage characteristics) | • Used to adjust the copy quality in the black/white graphic auto mode. |

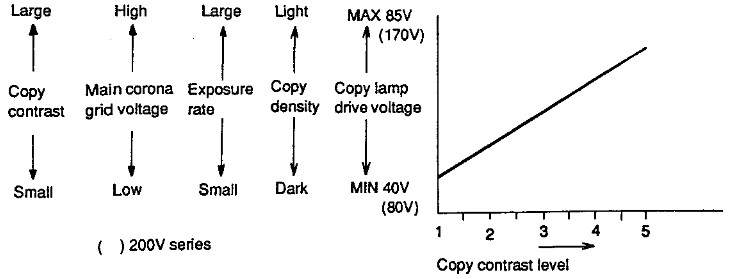
| S No. | Description | Function |
|---|---|---|
| 51 |  <br>(1) To adjust the copy quality (copy density) in the black/white graphic auto mode<br>Push C → 0 → 0 → C → 5 → 1 → COLOR PSW to do the following.<br>• The black/white indicator turns on.<br>• The auto copy mode indicator turn on.<br>• The current value is displayed in the copy quantity indicator.<br>① Type a number on the numeric keypad using a number between 0 and 99.<br>• The preset just entered will appear in the copy quantity dispaly.<br>② Push the BLACK-WHITE PSW.<br>• A black/white copy is produced.<br>• The new set value entered in (1) is stored in the memory.<br>Larger the set value, the higher becomes the copy lamp drive voltage becomes relative to the document density (AE sensor output) and the copy density becomes lighter.<br>If the set value is smaller, the copy lamp drive voltage relative to the document density (AE sensor output) becomes smaller and the copy density increases.<br>In the auto exposure mode, the copy lamp drive voltage is limited from 40V (80V) to 80V (160V).<br>Noted within ( ) is for 200V series. | |
| 52 | ○ Used to program the AE sensor limit.<br>By programming the limits for the AE sensor level to the AE sensor output in the full color graphic auto mode, the auto exposure control will perform to an optimum during the full color graphic auto exposure mode.<br>(Document density vs. AE sensor output)<br> <br>(1) To set the AE sensor limits<br>Push C → 0 → 0 → C → 5 → 2 → COLOR PSW to go into the following.<br>• The color copy lamp turns on.<br>• The monochrome lamps, red, green, and blue turn on.<br>• The preset AE sensor max. limit level is displayed in the copy quantity indicator.<br>① Enter the AE sensor max. limit level (51) with numeric keys.<br>• The entered value is displayed on the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The value entered in procedure ③ is set.<br>• The preset AE sensor min. limit level (Dark value-sky short- +3) is displayed on the copy quantity indicator.<br>③ Enter the AE sensor min. limit level (Dark value-sky shoot- +3) with numeric keys.<br>• The entered AE sensor min. limit level is displayed on the copy quantity indicator.<br>④ Push the COLOR PSW.<br>• The value entered in procedure ③ is set.<br>• The machine goes into the test function No. select standby state. | • Used to set the AE sensor limit level. |

| S No. | Description | Function |
|---|---|---|
| 52 | (2) How to obtain the set value<br>The AE sensor max. limit level is normally 51.<br>The AE sensor min. limit level = the average AE sensor level + 3<br>(Note) When the max. limit level is set smaller than the min. limit level, it is same as the key operations of C → 0 → 0 → C → 52 → COLOR PSW. | |
| 53 | o Used to adjust copy quality (density) in the preset auto copy mode. (The exposure level in the preset auto mode can be voluntarily set.)<br>o Used to adjust copy quality (contrast) in the preset auto mode. (The exposure level and the reference main corona grid voltage in the preset auto mode can be voluntarily set.<br>(Note) Only in the graphic mode. | - Used to adjust the copy quality in the preset auto mode<br>- Used to program the preset auto mode exposure level<br>- Used to set the preset auto mode copy contrast |

The auto mode exposure level (density) can be programmed to any setting on the basis of the test command 46 (manual copy mode quality adjustment) programmed exposure slope (copy density slope) and exposure level.



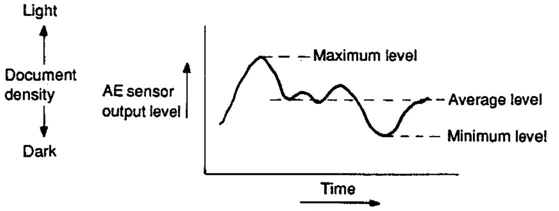
Copy density of yellow, magenta, and cyan can be separately adjusted in the full color copy mode.
The preset auto copy mode exposure level and basic main corona grid voltage can be programmed to any setting on the basis of the above described exposure level and gamma correction controlled main corona grid voltage.
Thus, the copy contrast can be adjusted.

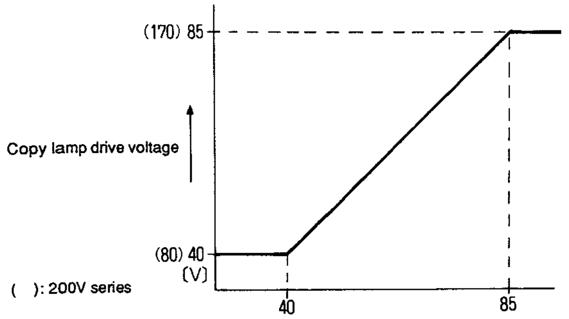


Copy density and copy contrast of yellow, magenta, and cyan can be separetely adjusted in the full color copy mode.
☆ Programming list

| Copy mode | | Adjust color | All colors | | Individual colors | |
|---|---|---|---|---|---|---|
| | | | EX | CONT | EX | CONT |
| Full color | GR | Y | — | — | — | — |
| | | M | | | — | — |
| | | C | | | — | — |
| | PH | Y | ☆ | ☆ | ☆ | — |
| | | M | | | ☆ | — |
| | | C | | | ☆ | — |
| Monochrome | GR | M | ☆ | — | — | — |
| | PH | M | ☆ | | | |
| Black and white | GR | BK | — | | | |
| | PH | BK | ☆ | | | |

| S No. | Description | Function |
|---|---|---|
| 53 | Push C → 0 → 0 → C → 5 → 3 → COLOR PSW to do the following.<br>(1) To program the preset auto copy mode density adjustment (exposure level setting)<br>a. To adjust the overall copy density (overall exposure level setting)<br>① Select the copy mode<br>• The overall copy density (exposure) level which is displayed in the copy density (exposure) level window is displayed.<br>② Determine the overall copy density (exposure) level using the copy density (exposure) level adjust key.<br>• The overall copy density (exposure) level is shown in the window.<br>③ Push the COLOR PSW.<br>• The overall copy density (exposure) programmed in (2) is now set.<br>• A copy is produced.<br>b. To adjust copy density by colors (individual color exposure level setup)<br>① Set the machine in the copy density (exposure) adjust mode using the mode select key provided behind the sub panel.<br>• The color copy density (exposure) adjust mode indicator behind the panel turns on.<br>• The respective individual color copy density (exposure) level indicator turns on.<br>② Select the color using the color select key provided behind the panel.<br>• The selected color indicator turns on.<br>③ Determine the copy density (exposure) using the adjust key behind the panel.<br>• The respective color copy density (exposure) indicator turns on.<br>④ Push the COLOR PSW.<br>• The individual color copy density (exposure) level set in (5) is now set.<br>• A copy is produced.<br>(2) To adjust the preset auto mode copy contrast (exposure level and basic main corona grid voltage setup)<br>a. To program the overall copy contrast adjustment (exposure level and main corona grid voltage setup) (Only in the graphic mode.)<br>① Set the machine in the full color graphic mode.<br>• The current programmed overall contrast level is displayed.<br>② Set a new overall contrast level using the contrast level adjust key.<br>• The newly selected overall contrast level is displayed on the sub the panel.<br>③ Push the COLOR PSW.<br>• A copy is produced.<br>• The new overall contrast level is set. | |
| 54 | ○ Used to adjust paper feed variation.<br>(Used to adjust the engagement of paper to the resist roller) | • (Used to program the time from when the paper pass detector (PPD2) sensed the paper to when the transport roller turns off) |
| | Used to adjust a lead edge image loss or void area deviation.<br>By adjusting the time required for the transport roller to turn off after the paper pass detector (PPD2) has sensed a paper, the engagement of the paper lead edge against the resist roller is determined. So, this test function should be used to correct a lead edge image loss or void area deviation due to a paper feed variation. | • Used to program the time for the transport roller to turn off after the paper pass detector (PPD2) sensed the paper.<br>(Used to program the engagement of the paper lead edge to the resist roller.) |

| S No. | Description | Function |
|---|---|---|
| 54 | Push C → 0 → 0 → C → 5 → 4 → COLOR PSW.<br>• The current setting is displayed in the copy quantity display. (1) is displayed in the copy quantity display.<br>① Type a number on the numeric keypad using a number between 0 and 99.<br>• The number just entered will appear in the copy quantity display.<br>② Push the COLOR PSW.<br>• The new value entered in ① is stored in the memory.<br>Entry of a large number will extend the time required for the transport roller to turn off after the paper pass detector (PPD2) sensed the paper.<br>Entry of a smaller number will short the time required for the transport roller to turn off after the paper pass detector (PPD2) sensed the paper.<br>Changing the preset value by one will change 5ms the time required for the transport roller to turn off after the paper pass detector (PPD2) sensed the paper.<br>(Ex): Using a number 10 will set the time to 50ms.<br>NOTE: The default is 6.<br>• When the PSW is pushed after depressing the counter recall key in this mode, five copies will be produced in the multicopy mode. | |
| 55 | ○ Used to display the AE sensor level.<br>Push C → 0 → 0 → C → 5 → 5 → 0 → COLOR PSW to go into the following.<br>• The copy lamp turns on under the regulated voltage of 70V (140V), the mirror base makes a full scan movement, and the AE sensor measures the document density.<br>• Maximum, minimum, and average density levels of the document (AE sensor output levels) are shown in the copy quantity display.<br> <br>To repeat it, push the COLOR PWS once again. | • Used to obtain the AE sensor maximum limit.<br>• Used to adjust the AE sensor input level. |
| 56 | ○ Used to evoke the function that displays the status of the copy lamp drive voltage control signal.<br>○ Used to evoke the function that displays the status of the main corona grid voltage control signal.<br>Used to check the developing bias voltage control circuit.<br>Calls the function that displays the status of the copy lamp drive voltage control signal that sent from the main PWB microprocessor to the slave PWB.<br>Calls the function that displays the status of the main corona grid voltage control signal input to the D/A converter) which is sent from the main PWB.<br>Calls the function that displays the status of the developing bias control signal that sent from the main PWB.<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 5 → 6 → COLOR PSW and do the following to select the subitem.<br>(1) To evoke the function that displays the status of the copy lamp drive voltage control signal.<br>① Type "1".<br>• "1" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The number in the copy quantity display goes out and the control goes standing by test command number entry.<br>• Now, the function has been set to display the status of the copy lamp drive voltage control signal. | • Used to check the copy lamp control circuit.<br>• Used to check the main corona control circuit.<br>• Used to check the function that displays the status of the developing bias control signal. |

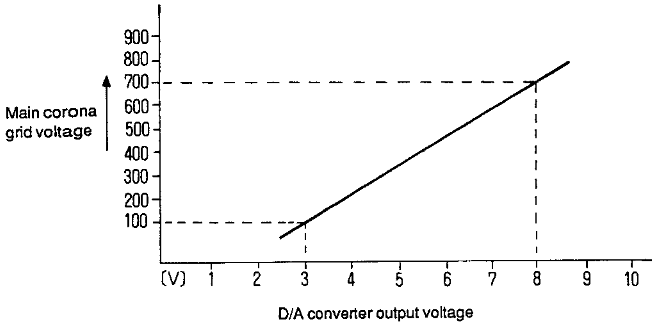
| S No. | Description | Function |
|---|---|---|
| 56 | a. To display the status of the copy lamp drive voltage control signal using the test command 7.<br>③ Do the test command 7 while you are in ② above (type 7 and push the COLOR PSW.)<br>• The copy lamp activates according to the copy lamp drive voltage set on the front panel and the status of the copy lamp drive voltage control signal (data signal) just sent from the main PWB microprocessor to the slave PWB is displayed in the copy quantity display.<br>b. To display the status of the copy lamp drive voltage control signal in the normal state.<br>③ After ② above, push the clear key to cancel the test function.<br>• The machine returns to the normal copy mode.<br>④ Push the COLOR PSW.<br>• The machine performs the copy operation according to the condition set on the front panel and the status of the copy lamp drive voltage control signal (data signal) just sent from the main PWB microprocessor to the slave PWB is displayed in the copy quantity display.<br>(Copy lamp drive voltage control signal vs. copy lamp drive voltage characteristics)<br><br> <br>Copy lamp drive voltage control signal characteristics curve<br>(In the case of the 100V series)<br>Copy lamp drive voltage control signal reading in the window = copy lamp drive voltage<br>(In the case of the 200V series)<br>Copy lamp drive voltage control signal reading in the window x2 = copy lamp drive voltage<br>(2) To set the function that displays the status of the main corona grid v voltage control signal<br>① Type "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• The number in the copy quantity display goes out and the control goes standing by test command number entry.<br>• The function is set to display the status of the main corona grid voltage control signal.<br>a. To display the status of the main corona grid voltage control signal using the test command 9<br>③ Do the test command 9 in the state of ② above (push 9 – COLOR PSW)<br>• The main corona grid voltage is issued appropriate to the front panel setting and the status of the main corona grid voltage control signal (D/A) converter input signal) that just received from the main PWB.<br>b. To display the status of the main corona grid voltage control signal in the normal mode.<br>③ After ② above, push the clear key to cancel the test function.<br>• The machine returns to the normal copy mode.<br>④ Push the COLOR PSW.<br>• The machine performs the copy operation according to the condition set on the front panel with the main corona grid voltage being issued and the status of the main corona grid control signal (D/A converter input signal) just sent from the PWB microprocessor is displayed in the copy quantity display. | |

| S No. | Description | Function |
|---|---|---|
| 56 | Main corona grid control voltage control signal vs. D/A converter output voltage | |

| Main corona grid voltage control signal (D/A converter 8-bit input signal) (Status) | D/A converter output voltage |
|---|---|
| 00 | 0V |
| \| | \| |
| FF | 10V |

256 steps

D/A converter output voltage vs. main corona grid voltage characteristics



(3) To set the function to display the status of the developing bias control signal

① Type "3".
- "3" is displayed in the copy quantity display.

② Push the COLOR PSW.
- The number in the copy quantity display goes out and the control goes standing by for test command number entry.
- The function is set to display the status of the developing bias control signal.

a. To display the status of the bias control signal using the test command 8

③ Do the test command 8 in the state of ② above (push 8 – COLOR PSW)
- The developing bias voltage is issued appropriate to the front panel setting and the status of the developing bias control signal just received from the main PWB is displayed in the copy quantity display.

b. To display the normal mode developing bias voltage control signal

③ After ② above, push the clear key to cancel the test function.
- The machine returns to the normal copy mode.

④ Push the COLOR PSW.
- The machine performs the copy operation according to the condition set on the front panel with the developing bias voltage being issued and the status of the developing bias voltage control signal just sent from the PWB microprocessor is displayed in the copy quantity display.

| Status displayed (Developing bias voltage control signal) | Developing bias voltage output |
|---|---|
| 1<br>(DVBC1) | DC −100±5V<br>(Developing bias voltage in the graphic dopy mode) |
| 2<br>(DVBC2) | DC −80±5V<br>(Developing bias voltage in the full copy mode) |
| 3<br>(DVBC3) | DC −60±5V<br>(Developing bias voltage in the warm-up period) |

NOTES:
- Any function started by this test function may not be canceled without doing one of the following:
  ① Push C → 0 → 0 → COLOR PSW.
  ② Turn the power switch off.
- Before returning to the normal copy mode, the function set by this test command needs to be canceled.

| S No. | Description | Function |
|---|---|---|
| 57 | o Used to adjust the reference main corona grid voltage. | • Used to adjust the main corona grid voltage. |

Push C → 0 → 0 → C → 5 → 7 → COLOR PSW and do the following to select the subitem.

(1) To adjust the color copy mode main corona grid voltage

① Push the paper seize select key to light Y, M, C developer lamps.

② Select the photo mode or the graphic mode with the photo mode key.

- The main corona grid voltage corresponding to the copy mode displayed in the copy number indicator is displayed.

③ Enter the set value (0 ~ 99) with numeric keys.

- The number just entered is displayed in the copy quantity.

④ Push the COLOR PSW.

- The value entered in ③ is stored in the memory.
- The number in the copy quantity indicator goes out and the control goes into stand by for test command number entry.

(2) To adjust the black-white mode main corona grid voltage

① Push the paper size select key to light BK developer lamp.

② Select the photo mode or the graphic mode with the photo mode key.

- The main corona grid voltage set value corresponding to the copy mode set in the copy quantity indicator is displayed.

③ Enter the set value (0 ~ 99) with numeric keys.

- The entered value is displayed on the copy quantity indicator.

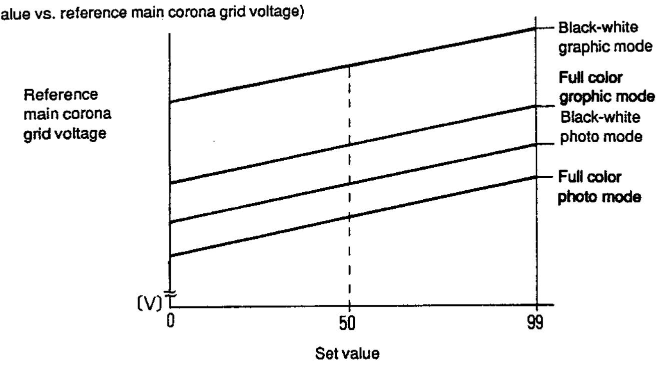
④ Push the COLOR PSW.

- The new value entered in ③ is stored in the memory.
- The number in the copy quantity display goes out and the control goes into stand by for test command number entry.

| Developer lamp | Photo mode lamp | Setting mode | Referance main corona grid voltage |
|---|---|---|---|
| Y, M, C lamp ON | OFF | Full color or monochrome graphic | DC –335 – (Memo sheet No. 38 set value –50) ±20V |
| | ON | Monochrome photo | DC –245 – (Memo sheet No. 39 set value –50) ±20V |
| BK lamp ON | ON | Black-white photo | DC –485 – (Memo sheet No. 49 set value –50) ±20V |
| | OFF | Black-white graphic | DC –295 – (Memo sheet No. 50 set value –50) ±20V |

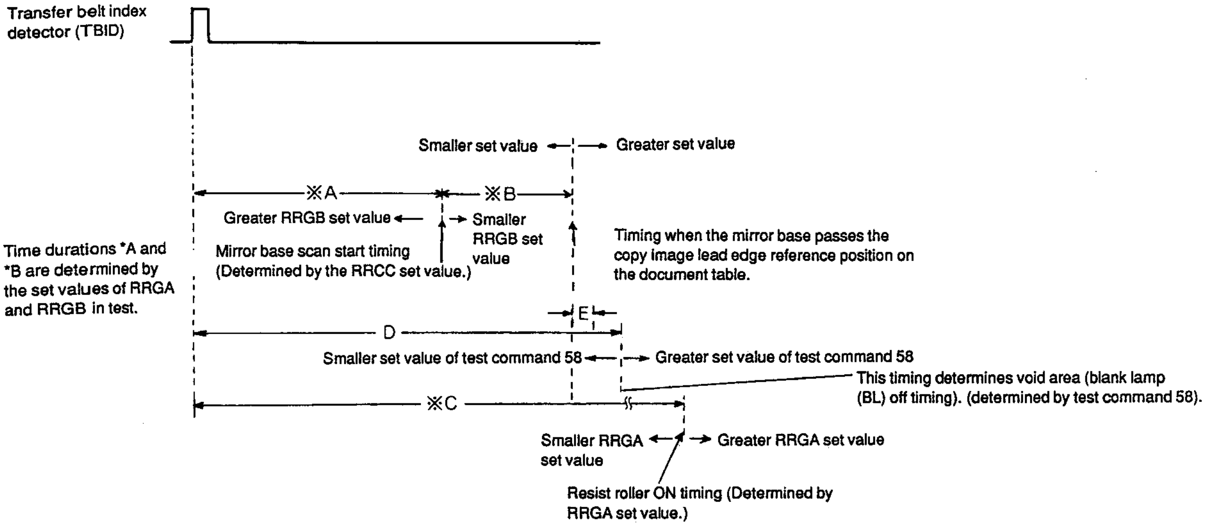
Entry of a larger number increases the reference main corona grid voltage.
Entry of a smaller number decreases the reference main corona grid voltage.
Changing the value by one will change the main corona grid voltage 1V.
In the full color photo mode, the main corona grid voltages in HD and LD areas are calculated using the grid voltage in the monochrome photo mode as the reference. (HD: DC –225V, LD: DC –175V)
Therefore, the adjustment of the main corona grid voltage in the full color photo mode (HD, LD areas) is not required.

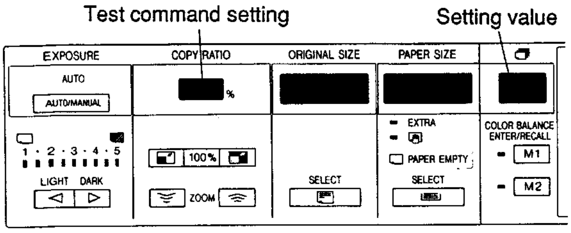
(Set value vs. reference main corona grid voltage)



| S No. | Description | Function |
|---|---|---|
| 58 | o Used to adjust the copy lead edge void area.<br>(Blank lamp (BL) off timing can be set to any timing. | • Used to adjust the copy lead edge void area. |

By changing the blank lamp (BL) off timing, the copy lead edge void can be adjusted.
The blank lamp (BL) off timing is determined by the position of the TX belt index and the timer setting.
Timer setting can be made by this test command.

| S No. | Description | Function |
|---|---|---|
| 58 |  Transfer belt index detector (TBID)<br>Smaller set value<br>Greater set value<br>※A<br>※B<br>Greater RRGB set value<br>Smaller RRGB set value<br>Mirror base scan start timing (Determined by the RRCC set value.)<br>Time durations *A and *B are determined by the set values of RRGA and RRGB in test.<br>Timing when the mirror base passes the copy image lead edge reference position on the document table.<br>E<br>D<br>Smaller set value of test command 58<br>Greater set value of test command 58<br>This timing determines void area (blank lamp (BL) off timing). (determined by test command 58).<br>※C<br>Smaller RRGA set value<br>Greater RRGA set value<br>Resist roller ON timing (Determined by RRGA set value.)<br>*A: Timer set time (Varies according to the copy magnification ratio.)<br>*B: Varies according to the copy magnification ratio.<br>*C: Timer set time<br>*D: Timer set time<br>*E: Time required for the PC belt to move from the exposure position to the blank lamp position<br>Push C → 0 → 0 → C → 5 → 8 → COLOR PSW to go into the following.<br>• Warm-up<br>• The photocopy mode indicator turns on.<br>• The lead edge void area adjusting value is displayed in the copy quantity display.<br>① Enter the set value with numeric keys.<br>• The entered value is displayed on the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The number entered in ① is stored in the memory.<br>• A copy is produced according to the value entered in ①.<br>Entry of a larger number delays the blank lamp (BL) off timing and thus the copy lead edge void area increases.<br>Entry of a smaller number accelerates the blank lamp (BL) off timing and thus the copy lead edge void area decreases.<br>Changing it by 1 will change the blank lamp (BL) off timing 1ms (copy lead edge void area increasing 0.2mm).<br>With this test function it is possible to produce five copies in the multicopy mode, when the PSW is pushed after activating the counter recall indicator using the counter recall key provided behind the panel.<br>NOTE: When the photo/graphic copy select key is pushed to extinguish the photocopy mode indicator in this test function mode, the control moves to the test command 50. | |
| 59 | ○ Used to display the settings in test command.<br>○ Used to program the test command setting.<br>With this function test command can be displayed without executing the test command. It is also possible to enter setting for test function.<br>Push C → 0 → 0 → C → 5 → 9 COLOR PSW and do the following.<br>① Enter a number corresponding to the test function setting using the fixed magnification ratio key and the zoom key. (See the table below.)<br>Fixed enlarge key: Used to enter tens order of the test command setting (count up)<br>Fixed reduce key: Used to enter tens order of the test command setting (count down)<br>Zoom down key: Used to enter ones order corresponding to the test command setting (count up).<br>Zoom up key: Used to enter ones order corresponding to the test command setting (count down).<br>• The serial number corresponding to the test command setting is displayed in the magnification window.<br>• The value corresponding to the test command setting is displayed in the copy quantity indicator. | • Used to check the test command settings.<br>• Used to enter setting for test command. |

| S No. | Description | Function |
|---|---|---|
| 59 |  Test command setting<br>Setting value<br>EXPOSURE<br>COPY RATIO<br>ORIGINAL SIZE<br>PAPER SIZE<br>AUTO<br>AUTO/MANUAL<br>%<br>1 · 2 · 3 · 4 · 5<br>LIGHT DARK<br>100%<br>ZOOM<br>SELECT<br>SELECT<br>EXTRA<br>PAPER EMPTY<br>COLOR BALANCE ENTER/RECALL<br>M1<br>M2<br>Do the following to enter the setting.<br>② Type the number on the numeric keypad.<br>• The new number is displayed in the copy quantity indicator.<br>③ Push the COLOR PSW.<br>• The number entered in ② is stored in the memory. | |

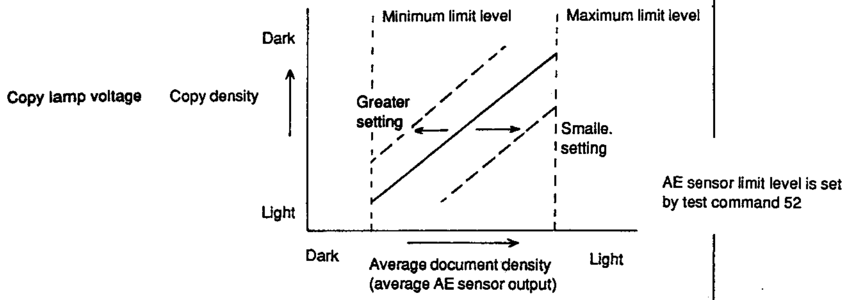
| Serial number corresponding to the test command setting | Function | Test command number |
|---|---|---|
| 0 | Copy lead edge location<br>(Resist roller on timing)(RRC-A) | 50 |
| 1 | Paper lead edge engagement to the resist roller<br>(Time the TX roller turns off after the paper pass detector (PPD2) sensed the paper. | 54 |
| 2 | Copy lead edge void area<br>(Blank lamp off timing) | 58 |
| 3 | Full color manual graphic mode copy density (Yellow exposure level for the copy density level 1) | 46 |
| 4 | Full color manual graphic mode copy density (Magenta exposure level for the copy density level 1) | 46 |
| 5 | Full color manual graphic mode copy density<br>(Cyan exposure level for the copy density level 1) | 46 |
| 6 | Black and white manual graphic mode copy density<br>(Exposure level for the copy density level 1) | 46 |
| 7 | Monochrome manual graphic mode copy density<br>(Exposure level for the copy density level 1) | 46 |
| 8 | Full color manual photo mode high copy density (Yellow exposure level for the high density (HD) image area) | 46 |
| 9 | Full color manual photo mode high copy density (Magenta exposure level for the high density (HD) image area) | 46 |
| 10 | Full color manual photo mode high copy density (Cyan exposure level for the high density (HD) image area) | 46 |
| 11 | Black and white manual photo mode copy density<br>(Exposure level for the copy density level 3) | 46 |
| 12 | Monochrome manual photo mode copy density<br>(Exposure level for the copy density level 3) | 46 |
| 13 | Full color manual graphic mode copy density (Yellow exposure level for the copy density level 5) | 46 |
| 14 | Full color manual graphic mode copy density (Magenta exposure level for the copy density level 5) | 46 |
| 15 | Full color manual graphic mode copy density<br>(Cyan exposure level for the copy density level 5) | 46 |
| 16 | Black and white manual graphic mode copy density<br>(Exposure level for the copy density level 5) | 46 |
| 17 | Monochrome manual graphic mode copy density<br>(Exposure level for the copy density level 5) | 46 |
| 18 | Full color manual photo mode low copy density (Yellow exposure level for the low density (LD) image area) | 46 |
| 19 | Full color manual photo mode low copy density (Magenta exposure level for the low density (LD) image area) | 46 |
| 20 | Full color manual photo mode low copy density (Cyan exposure level for the low density (LD) image area) | 46 |
| 21 | | |
| 22 | Fuser section operation mode expansion<br>'0': The fuser unit rotates during ready state.<br>'1': The fuser unit rotates immediately after the machine goes into ready state. | |
| 23 | Horizontal magnification ratio<br>(Mirror base scan speed) | 49 |
| 24 | Black and white auto exposure graphic mode copy density<br>(AE sensor output characteristics setup) | 51 |
| 25 | Maximum AE sensor limit level (For pre-scan) | 52 |

| S No. | Description | Function |
|---|---|---|
| 59 | | |

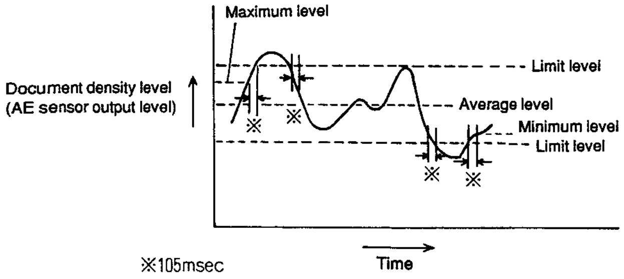
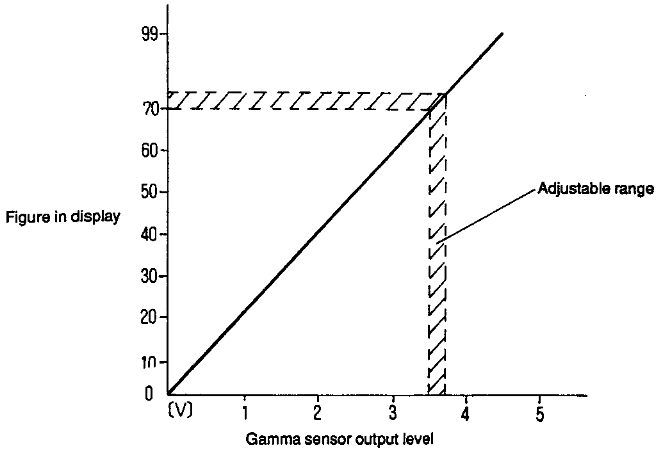
| Serial number corresponding to the test command and setting | Function | Test command number |
|---|---|---|
| 26 | Minimum AE sensor limit level | 52 |
| 27 | Full color preset auto photo mode copy density<br>(Overall exposure level) | 53 |
| 28 | Full color preset auto photo mode copy contrast<br>(Overall contrast) | 53 |
| 29 | Full color preset auto photo mode copy density<br>(Yellow exposure level) | 53 |
| 30 | Full color preset auto photo mode copy density<br>(Magenta exposure level) | 53 |
| 31 | Full color preset auto photo copy mode copy density in the slide film copy mode<br>(Cyan exposure level) | 53 |
| 32 | Full color photo copy mode copy density in the slide film copy mode<br>(Yellow contrast) | 53 |
| 33 | Full color photo copy mode copy density in the slide film copy mode<br>(Magenta contrast) | 53 |
| 34 | Full color photo mode copy density in the slide film copy mode<br>(Cyan contrast) | 53 |
| 35 | Black and white preset auto photo mode copy density<br>(Exposure level) | 53 |
| 36 | Monochrome preset auto graphic mode copy density<br>(Exposure level) | 53 |
| 37 | Monochrome preset auto photo mode copy density<br>(Exposure level) | 53 |
| 38 | Color graphic mode basic main corona grid voltage | 57 |
| 39 | Color photo mode basic main corona grid voltage | 57 |
| 40 | PC belt sensitivity | 45 |
| 41 | Gamma correction basic level (Yellow) | 60 |
| 42 | Gamma correction basic level (Magenta) | 60 |
| 43 | Gamma correction basic level (Cyan) | 60 |
| 44 | Spec (destination) setting | 79 |
| 45 | Full color auto photo mode copy density<br>(Main corona grid voltage) | 63 |
| 46 | Black-white auto copy mode sensitivity selection | — |
| 47 | Vertical copy magnification ratio<br>(Lens home position) | 48 |
| 48 | Copy image lead edge position (RRC-B)<br>(Resist roller ON timing)<br>(TX belt copy image lead edge area) | 50 |
| 49 | Black-white graphic mode reference main corona grid voltage. | 57 |
| 50 | Black-white photo mode reference main corona grid voltage. | 57 |
| 53 | Full color graphic Yellow balance in the slide film copy mode | |
| 54 | Full color graphic Magenta balance in the slide film copy mode | |
| 55 | PA motor speed control at 184 mm/s | |
| 56 | PA motor speed control at 115 mm/s | |
| 57 | PA motor speed control at 60 mm/s | |
| 58 | PC motor speed control | |
| 59 | Initial magnification ratio at slide mode selection | |
| 60 | Full color graphic Cyan balance in the slide film copy mode | |
| 61 | Improper registration scan adjustment value | |
| 62 | Toner density sensor level adjustment reference (Yellow) | 25 |
| 63 | Toner density sensor level adjustment reference (Magenta) | 25 |
| 64 | Toner density sensor level adjustment reference (Cyan) | 25 |
| 65 | Toner density sensor level adjustment reference (Blue) | 25 |
| 66 | | |
| 67 | | |
| 68 | Auto exposure adjustment (AEA) target value (Yellow) | |
| 69 | Auto exposure adjustment (AEA) target value (Magenta) | |
| 70 | Auto exposure adjustment (AEA) target value (Cyan) | |
| 71 | Auto exposure adjustment (AEA) target value (Monochrome) | |
| 72 | | |
| 73 | | |

| S No. | Description | Function |
|---|---|---|
| 60 | ○ Used to program the gamma sensor reference level.<br>Used to store in the memory the gamma sensor output level to each toner image density on the TX belt when the main corona grid voltage voltage (PC belt surface potential) is at DC –175V.<br>This is called gamma sensor reference level.<br>The gamma correction reference level needs to be programmed for yellow, magenta, and cyan.<br>Push C → 0 → 0 → C → 6 → 0 → COLOR PSW.<br>• The black and white ready lamp turns on.<br>① With the paper size select key, select the color to which the gamma sensor reference level is set.<br>You will know the kind of the color on the developer indicator.<br>• The developer indicator of the selected color blinks.<br>• The existing gamma correction sensor reference level is displayed in the copy quantity display.<br>② Push the BLACK-WHITE PSW.<br>• The state selected in ① is retained.<br>• The color copy ready lamp turns on.<br>NOTE: With the depression of the black/white PSW again, the state selected in ① is canceled and the color ready lamp goes out.<br>③ Push the COLOR PSW.<br>• The gamma correction sensor reference level is set.<br>Do ① through ③ for each color of yellow, magenta, and cyan.<br>By continuously doing ① through ②, you can fix the all color select state.<br>NOTE: This test should be performed only when new color developers (other than BLACK-WHITE) are installed.<br>In the case of undertoner, the gamma correction sensor basic level may not be retained. | • Used to program the gamma sensor reference level. |
| 61 | ○ Used to do gamma correction.<br>○ Used to measure the TX belt toner image density and to display its level.<br>Use a numeric key to select the mode.<br>Push C → 0 → 0 → C → 6 → 1 → COLOR PSW.<br>(1) To do the gamma correction<br>① Enter "1" with numeric key.<br>• "1" is displayed in the copy quantity indicator.<br>② Push the COLOR PSW.<br>• The gamma correction takes place, regardless of the main PWB gamma correction switch position (spec setup switch) and the fuser temperature.<br>(2) To measure the TX belt toned image indicator.<br>① Enter "2".<br>• "2" is displayed in the copy quantity display.<br>② Push the COLOR PSW.<br>• Only the TX belt toned image area measurement is done. As the main corona grid voltage changes from DC –55 to 385V in increments of 30V steps and density of each toned image (gamma sensor output) on the TX belt is measured.<br>(3) To display the TX belt toned image density (gamma sensor output) and the gamma sensor basic level that programmed by the test function 60<br>① Enter the number appropriate to the display status using the fixed magnification key and zoom key (similar as the test command 59).<br>Fixed enlarge key: Used to enter tens order of the test command setting (count up)<br>Fixed reduce key: Used to enter tens order of the test command setting (count down)<br>Zoom down key: Used to enter ones order appropriate to the test command setting (count up).<br>Zoom up key: Used to enter ones order appropriate to the test command setting (count down).<br>• The number appropriate to the test command status is displayed in the magnification window.<br>• The number appropriate to the test command status is displayed in the copy quantity indicator. | • Used to check the gamma sensor output level.<br>• Used to check the gamma correction sensor basic level programmed by the gamma correction. |

<table>
<tr><th>S No.</th><th>Description</th><th>Function</th></tr>
<tr><td>61</td><td colspan="2">
<table>
<tr><th>Status</th><th>Description</th></tr>
<tr><td>0</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –55V.</td></tr>
<tr><td>1</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –85V.</td></tr>
<tr><td>2</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –115V.</td></tr>
<tr><td>3</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –145V.</td></tr>
<tr><td>4</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –175V.</td></tr>
<tr><td>5</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –205V.</td></tr>
<tr><td>6</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –235V.</td></tr>
<tr><td>7</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –265V.</td></tr>
<tr><td>8</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –295V.</td></tr>
<tr><td>9</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –325V.</td></tr>
<tr><td>10</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –355V.</td></tr>
<tr><td>11</td><td>TX belt toner density (gamma sensor output) level (yellow) when the main corona grid voltage is DC –385V.</td></tr>
<tr><td>12</td><td>Gamma sensor basic level (yellow) programmed by the test function 60.</td></tr>
<tr><td>13<br>|<br>24</td><td>Gamma sensor output level (magenta) when the main corona grid voltage is DC –55 ~385V.</td></tr>
<tr><td>25</td><td>Gamma sensor basic level (magenta) programmed by the test function 60.</td></tr>
<tr><td>26<br>|<br>37</td><td>Gamma sensor output level (cyan) when the main corona grid voltage is DC –55 ~ 385V.</td></tr>
<tr><td>38</td><td>Gamma sensor basic level (cyan) programmed by the test function 60.</td></tr>
<tr><td>39</td><td>Gamma sensor output level when there is no image on the TX belt.</td></tr>
</table>
</td></tr>
<tr><td>63</td><td>
○ Used to adjust the copy quality (copy density) in the full color auto graphic copy mode.<br>
(The average document density vs. copy lamp voltage characteristics may be programmed to any desired degree in the full color auto graphic copy mode.)
<hr>
By changing the document average density (average AE sensor level) vs. copy lamp voltage, the copy lamp voltage changes respective to the average document density (average AE sensor output level). Whereas, the copy density level changes accordingly.<br>
Average document density (average AE sensor output level) vs. copy density (copy lamp voltage) characteristics



Push C → 0 → 0 → C → 6 → 3 → COLOR PSW.
<ul>
<li>Warm-up</li>
<li>The existing number is displayed in the copy quantity indicator.</li>
</ul>
① Type a number on the numeric keypad using a number between 2 and 18.
<ul><li>The number just entered will appear in the copy quantity display.</li></ul>
② Push the COLOR PSW.
<ul>
<li>The new value entered in ① is stored in the memory.</li>
<li>A copy is produced.</li>
<li>When a greater value is set, the average copy density (the copy lamp voltage for the average AE sensor output value) increases and the copy density becomes greater.</li>
<li>When a smaller value is set, the average copy density (the copy lamp voltage for the average AE sensor output value) increases and the copy density becomes lighter.)</li>
</ul>
</td><td>• Used to adjust the full color photo mode copy quality (copy density).</td></tr>
</table>

| S No. | Description | Function |
|---|---|---|
| 63 | NOTE: The default is 12, maximum 18, and minimum is 2. Setting above 19 and under 1 may not be valid because of the limits. | |
| 65 | ○ Used to display the AE sensor output level when the limiter is active.<br>Used to display document density (AE sensor output) level relative to the test command 52 programmed AE sensor limit levels. | |
| 65 |  <br>Push C → 0 → 0 → C → 6 → 5 → COLOR PSW.<br>• As the copy lamp is driven under the regulated voltage, the mirror base makes a full scan and the document density (AE sensor output) is sensed.<br>• Maximum, average, and minimum document densities (AE sensor outputs) are displayed in the copy quantity indicator. | |
| 66 | ○ Used to adjust the gamma sensor PWB.<br>A yellow toned image is formed on the TX belt and the gamma correction sensor output level for that toned image density is displayed.<br>Push C → 0 → 0 → C → 6 → 6 → COLOR PSW.<br>• The gamma sensor output level is displayed in the copy quantity display.<br>• All yellow toned image is formed on the TX belt.<br>• When that image area comes under the gamma correction sensor, the TX belt stops.<br>(No gamma is corrected with this test function and the main corona grid voltage is DC −375V.)<br>(1) To adjust the gamma sensor PWB (gamma sensor output level)<br>① In the above state, rotate the gamma sensor PWB VR1 to adjust the gamma sensor output level (copy number indicator window figure) to be 70±2.<br> | • Used to adjust the gamma sensor PWB. |
| 79 | ○ Used to select specification.<br>Push C → 0 → 0 → C → 7 → 9 → COLOR PSW.<br>① Enter the number on the numeric keypad appropriate to the specification.<br>• The number entered is displayed in the copy number indicator window.<br>② Push the COLOR PSW.<br>• The specification entered in ① is stored in the memory. | • Used to enter the specification of the machine. |

| S No. | Description | Function |
|---|---|---|
| 79 | | |

| Maintenance preset value | Paper spec. | Destination | Power specification | | Set value |
|---|---|---|---|---|---|
| | | | 100V/200V | 50Hz/60Hz | |
| Fixed | AB | JAPAN (With B5 cassette) | 100 | 60 | 00 |
| | | | | 50 | 10 |
| | | Outside JAPAN | 100 | 60 | 01 |
| | | | | 50 | 11 |
| | | | 200 | 60 | 05 |
| | | | | 50 | 15 |
| | Inch | SEC (With LT cassette) | 100 | 60 | 02 |
| | | | | 50 | 12 |
| | | | 200 | 60 | 06 |
| | | | | 50 | 16 |
| | | Outside SEC | 100 | 60 | 03 |
| | | | | 50 | 13 |
| | | | 200 | 60 | 07 |
| | | | | 50 | 17 |
| Variable | AB | JAPAN (With B5 cassette) | 100 | 60 | 20 |
| | | | | 50 | 30 |
| | | Outside JAPAN | 100 | 60 | 21 |
| | | | | 50 | 31 |
| | | | 200 | 60 | 25 |
| | | | | 50 | 35 |
| | Inch | SEC (With LT cassette) | 100 | 60 | 22 |
| | | | | 50 | 32 |
| | | | 200 | 60 | 26 |
| | | | | 50 | 36 |
| | | Outside SEC | 100 | 60 | 23 |
| | | | | 50 | 33 |
| | | | 200 | 60 | 27 |
| | | | | 50 | 37 |

This test command sets the following items:

- Fixed copy magnification ratio
- Copy lamp drive voltage
- Priority select function for the 8 1/2" x 5 1/2" cassette
- Paper cassette size display

**95**

○ Used to set default setting.

As settings are automatically set at the start up, the machine will operate under the standard settings.
Used to start the machine after cancelling problem status U2 or main PWB replacement, etc.
Push C → 0 → 0 → C → 9 → 5 → COLOR PSW.

- The photo mode indicator blinks.

① Push the photo/graphic copy mode selector.
  - A blinking "dF" is displayed in the copy quantity indicator.

② Push the COLOR PSW.
  - All machine specifications are set to their defaults.

| Setting (default) by test function 95 | Function | Test command number |
|---|---|---|
| 50 | Copy lead edge location<br>(Resist roller on timing)(RRC-A) | 50 |
| 12 | Paper lead edge engagement to the resist roller<br>(Time the TX roller turns off after the paper pass detector (PPD2) sensed the paper. | 54 |
| 50 | Copy lead edge void area<br>(Blank lamp off timing) | 58 |
| 52 | Full color manual graphic mode copy density (Yellow exposure level) | 46 |
| 42 | Full color manual graphic mode copy density (Magenta exposure level for the copy density level 1) | 46 |
| 43 | Full color manual graphic mode copy density<br>(Cyan exposure level for the copy density level 1) | 46 |
| 59 | Black and white manual graphic mode copy density<br>(Exposure level for the copy density level 1) | 46 |
| 44 | Monochrome manual graphic mode copy density<br>(Exposure level for the copy density level 1) | 46 |
| 52 | Full color manual photo mode HD area copy density (Yellow exposure level ) | 46 |

| S No. | Description | Function |
|---|---|---|
| 95 | | |

| Setting (default) by test function 95 | Function | Test command number |
|---|---|---|
| 44 | Full color manual photo mode HD area copy density (Magenta exposure level) | 46 |
| 43 | Full color manual photo mode HD area copy density (Cyan exposure level) | 46 |
| 51 | Black and white manual photo mode copy density<br>(Exposure level for the copy density level 3) | 46 |
| 51 | Monochrome manual photo mode copy density<br>(Exposure level for the copy density level 3) | 46 |
| 31 | Full color manual graphic mode copy density (Yellow exposure level for the copy density level 5) | 46 |
| 22 | Full color manual graphic mode copy density (Magenta exposure level for the copy density level 5) | 46 |
| 19 | Full color manual graphic mode copy density<br>(Cyan exposure level for the copy density level 5) | 46 |
| 34 | Black and white manual graphic mode copy density<br>(Exposure level for the copy density level 5) | 46 |
| 22 | Monochrome manual graphic mode copy density<br>(Exposure level for the copy density level 5) | 46 |
| 41 | Full color manual photo mode LD arear copy density<br>(Magenta exposure level) | 46 |
| 33 | Full color manual photo mode LD area copy density<br>(Cyan exposure level) | 46 |
| 27 | Black-and-white manual photo mode LD area copy density<br>(Exposure level) | 46 |
| 0 | Fuser operation control<br>"0": Rotation during ready state<br>"1": No rotation during ready state | — |
| 56 | Transverse copy magnification ratio<br>(Mirror base scan speed) | 49 |
| 66 | Black and white auto exposure graphic copy mode copy density<br>(AE sensor output characteristics setup) | 51 |
| 51 | Maximum AE sensor limit level | 52 |
| 10 | Minimum AE sensor limit level | 52 |
| 5 | Full color preset auto photo mode copy density<br>(Overall exposure level) | 53 |
| 5 | Full color preset auto photo mode copy contrast<br>(Overall contrast) | 53 |
| 5 | Full color preset auto photo mode copy density<br>(Yellow exposure level) | 53 |
| 5 | Full color preset auto photo mode copy density<br>(Magenta exposure level) | 53 |
| 5 | Full color preset auto photo mode copy density<br>(Cyan exposure level) | 53 |
| 5 | Slide film copy mode full color preset auto photo mode copy density<br>(Yellow contrast) | — |
| 5 | Slide film copy mode full color preset auto photo mode copy density<br>(Magenta contrast) | — |
| 5 | Slide film copy mode full color preset auto photo mode copy density<br>(Cyan exposure level) | — |
| 5 | Black and white preset auto photocopy mode copy density<br>(Exposure level) | 53 |
| 5 | Monochrome preset auto graphic mode copy density<br>(Exposure level) | 53 |
| 5 | Monochrome preset auto photo copy mode copy density<br>(Exposure level) | 53 |
| 50 | Photocopy mode basic main corona grid voltage (Color, Black-white) | 57 |
| 2 | PC belt sensitivity | 45 |
| 0 (*1) | Gamma correction basic level (Yellow) | 60 |
| 0 (*1) | Gamma correction basic level (Magenta) | 60 |
| 0 (*1) | Gamma correction basic level (Cyan) | 60 |
| 02 | Spec (destination) setting | 79 |
| 12 | Full color auto graphic mode copy density<br>(Gammar characteristics) | 63 |
| 5 | Black-and-white auto exposure sensitivity selection | — |
| 46 | Longitudinal copy magnification<br>(Lens home position) | 48 |
| 50 | Copy image lead edge position (RRC-B)<br>(TX belt copy image lead edge area) | 50 |
| 50 | Black-white graphic mode basic main corona grid voltage | 57 |
| 50 | Black-white photo graphic mode basic main corona grid voltage | 57 |
| 0 | Scan maintenance preset counter mode setting | |
| 0 | Copy maintenance preset counter mode setting | |
| 5 | Slide film mode full color graphic copy mode Yellow balance | — |

| S No. | Description | Function |
|---|---|---|

**95**

| Setting (default) by test function 95 | Function | Test command number |
|---|---|---|
| 5 | Slide film mode full color graphic copy mode Magenta balance | — |
| 49 | PA motor speed adjustment at 184mm/sec | — |
| 49 | PA motor speed adjustment at 115mm/sec | — |
| 50 | PA motor speed adjustment at 60mm/sec | — |
| 50 | PC motor speed adjustment value | — |
| 42 | Initial magnification ratio in the slide film mode | — |
| 5 | Slide film mode full color graphic copy mode Cyan balance | — |
| 5 | Mis-resist scan adjustment value | — |
| 50 | Toner density sensor level adjustment reference value (Yellow) | 25 |
| 50 | Toner density sensor level adjustment reference value (Magenta) | 25 |
| 50 | Toner density sensor level adjustment reference value (Cyan) | 25 |
| 50 | Toner density sensor level adjustment reference value (Black) | 25 |
| (*2) | Main corona grid voltage (Yellow) after gamma correction | |
| (*2) | Main corona grid voltage (Magenta) after gammer correction | |
| (*2) | Main corona grid voltage (Cyan) after gammer correction | |
| (*3) | AE sensor output characteristics | 47 |

(*1): Setting 0 will not perform the gamma correction and the basic main corona grid voltage in the graphic mode and in the photo mode will be set as shown below:

(*2): Gamma correction is performed and the basic main corona grid voltage in the graphic mode and in the photo mode are set as shown below:

(*3): The AE sensor output characteristics are fixed to a certain level.

Main corona grid voltage
- Full color or monochrome graphic mode: (–335V)
- Full color photo (LD) mode: (–175V)
- Full color photo (HD) mode: (–225V)
- Monochrome photo mode: (–245V)

**96**

- o The lens base shifts to the 64% position.
- o The screen is reset.
- o All filters are reset.
- o The mirror base moves to the home position.

Before relocation of the copier this test command must be executed to lock the lens base and the mirror base.

- Used before transporting the copier.

**99**

- o Used to evoke the program used to display the A/D converter output level.

Use a numeric keypad to select the mode.
Push C → 0 → 0 → C → 9 → 9 → COLOR PSW.

① Type the number of the function to be displayed.
- The number just entered is displayed in the copy quantity display.

② Push the COLOR PSW.
- The level of the A/D converter output is displayed in hexadecimal 8 bits, in response to the number appearing in the copy quantity display.

| Number displayed | Function |
|---|---|
| 0 | Upper cassette size sensor (CSS1) output level |
| 1 | Lower cassette size sensor (CSS2) output level |
| *4 | Gamma correction sensor output level |
| 5 | Fuser thermistor output level |
| *6 | Battery voltage level |
| 7 | Reserved |

| Sensor output voltage (A/D converter input voltage) | A/D converter output signal (8-bit) |
|---|---|
| 0V<br>\|<br>5V | 00<br>\| 256 steps<br>FF |

NOTES:
- The function evoked by this test command may not be canceled without doing one of the following:
  ① Push C → 0 → 0 → COLOR PSW.
  ② Power off
- Noted with an asterisk (*) is not output at all times.

- Used to check the A/D converter.

# [19 ] Installation of options

## (1) Copy auditor (SF-425)

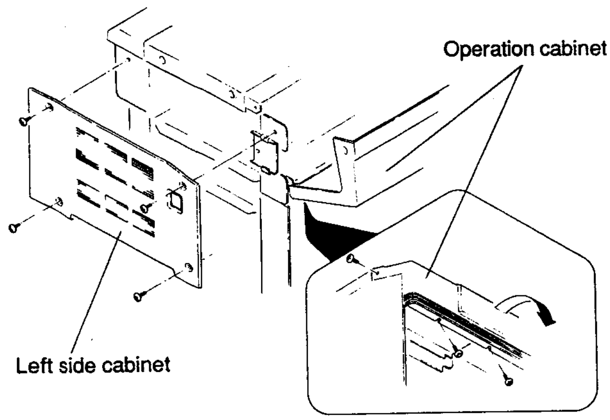
### (List of parts in the package)

| | |
|---|---|
| Mounting angle | x 1 |
| Counter cover | x1 |
| Spacer (Small) | Not required when installing to the CX-7700. |
| Sapacer (large) | x 2 For the CX-7700/7500 |
| Clamp | x 1 |
| Cord bushing | x1 |
| Screw (M4 x 16) | x 2 |
| Screw (M4 x 6)x 4 | |

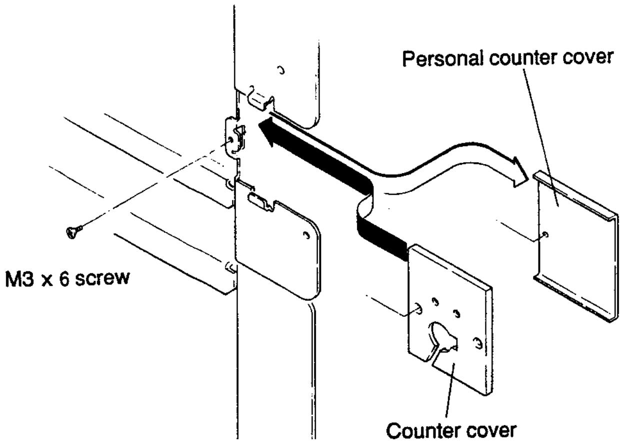
### (Installation)

(1) Open the front cover of the copier, and open the operation exterior.

(2) Remove the left side exterior.


Operation cabinet
Left side cabinet

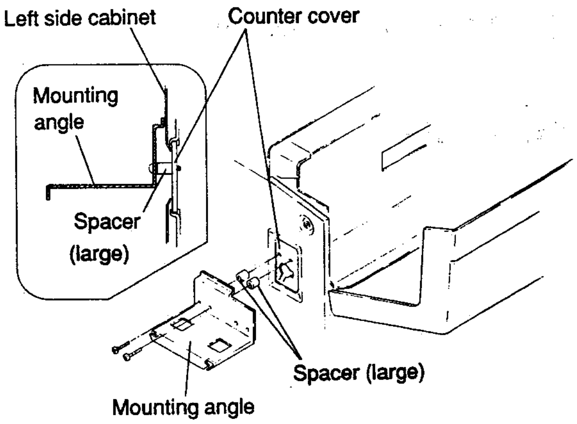
(3) Remove the personal counter cover, insert the counter cover included in the same package as shown in the figure, and fix it with the counter cover fixing screw (M3 x 6).


Personal counter cover
M3 x 6 screw
Counter cover

(4) Install the left side exterior.

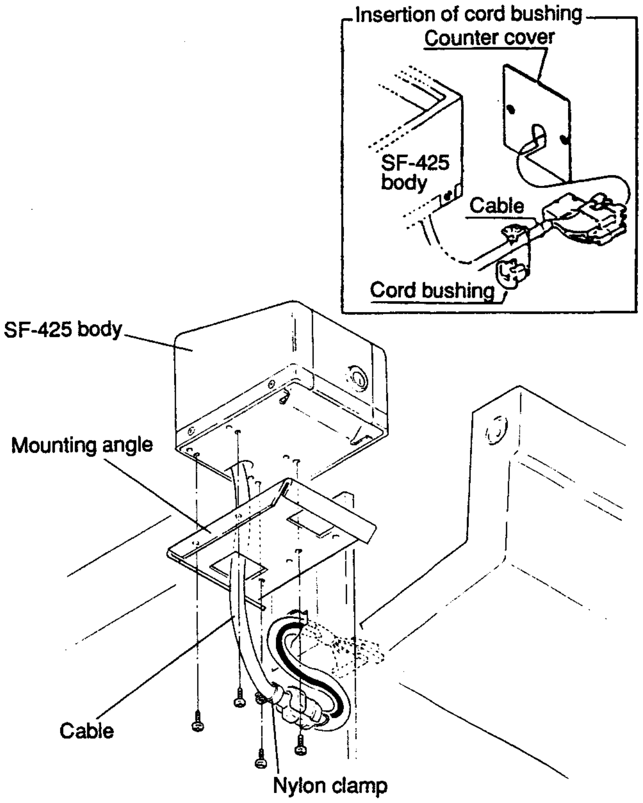
(5) Install the department control counter mounting angle to the counter cover as shown in the following figure:

* Insert the two spacers (for the CX-7700/7500) between the mounting angle and the counter cover.

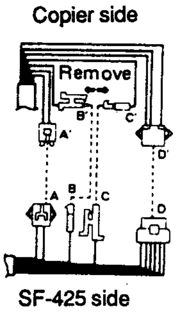

Left side cabinet
Counter cover
Mounting angle
Spacer (large)
Spacer (large)
Mounting angle

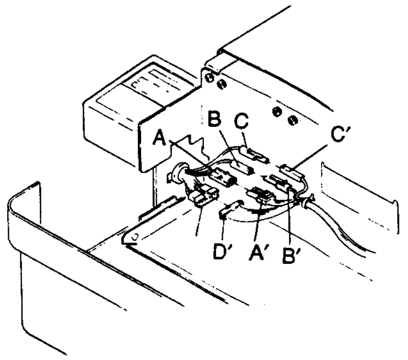
(6) Pass the SF-425 cable through the square hole of the mounting angle and the counter cover into the copier body.

(7) Attach the mounting angle to the SF-425 with four screws as shown in the figure below, and fix the cable with nylon clamps.


Insertion of cord bushing
Counter cover
SF-425 body
Cable
Cord bushing
SF-425 body
Mounting angle
Cable
Nylon clamp

(8) Remove the connectors B' and C' from the copier body, and connect the SF-425 connector to the copier connector as shown in the figure below:


Copier side
Remove
A'
B'
C'
D'
A
B
C
D
SF-425 side



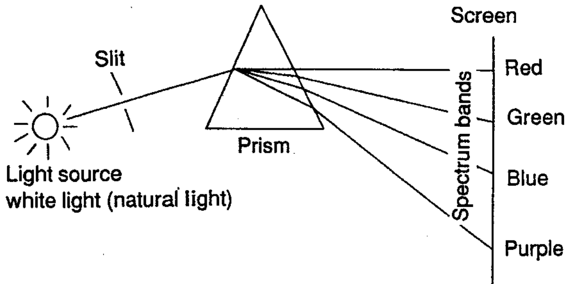
(9) Close the operation exterior and fix with screws.

(10) Close the front cover.

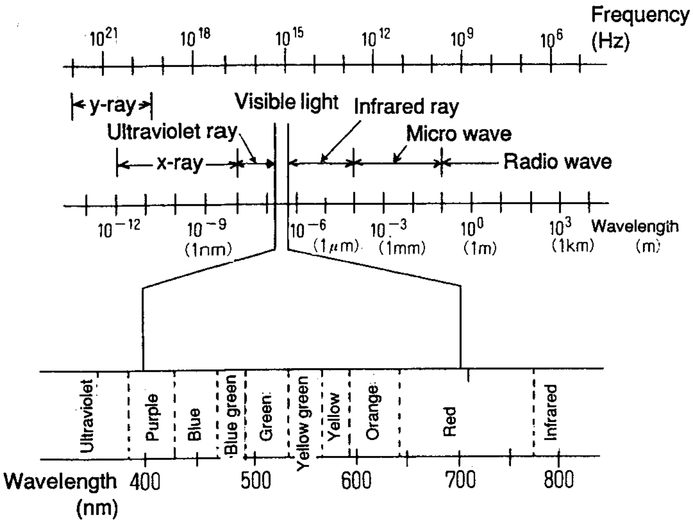
# [20] LIGHT AND COLOR

## 1. Visible light

Light is a kind of electromagnetic wave. Human eyes can recognize wavelength of light at 400nm to 700nm, which is called "visible light". Red, orange, yellow, green, blue, and purple colors are included in this wavelength range. Natural light (sunlight) consists of these elements of colors. When the daylight is separated into spectrum components using the prism, the these colors appear in succession in a form of bands. In other words, conversion of these colors makes up "white" light or daylight.


Screen
Slit
Red
Green
Blue
Purple
Spectrum bands
Prism
Light source
white light (natural light)

Spectrum (light separation)

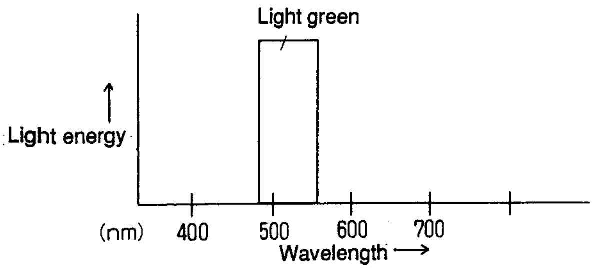

Frequency (Hz)
$10^{21}$
$10^{18}$
$10^{15}$
$10^{12}$
$10^{9}$
$10^{6}$
γ-ray
Visible light
Infrared ray
Ultraviolet ray
Micro wave
x-ray
Radio wave
$10^{-12}$
$10^{-9}$ (1nm)
$10^{-6}$ (1μm)
$10^{-3}$ (1mm)
$10^{0}$ (1m)
$10^{3}$ (1km)
Wavelength (m)
Ultraviolet
Purple
Blue
Blue green
Green
Yellow green
Yellow
Orange
Red
Infrared
Wavelength (nm)
400
500
600
700
800

## 2. Light wavelength, energy, and color

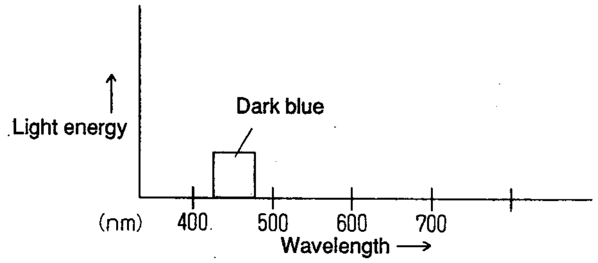
Human sensations on colors depend on the energy of the light and wavelength distribution. Different wavelength gives different color sense. Magnitude of light energy determines degree of illumination. Larger the light energy is, lighter the color is felt, and, smaller the light energy is, the lighter the color is felt.

(Ex): Light having the characteristics of "A" below is sensed as light green. And, the light having the characteristics of "B" below is sensed as dark blue.

(A)



(B)



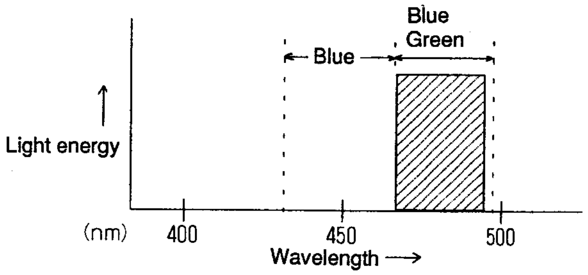
In the preceding explanation on the relationship between color and wavelength, boundaries are provided between typical colors for expedient recognition. In fact, however, there are a variety of colors (intermediate colors) existing continuously in the color spectrum.

### A. Colors difference according to a difference in wavelength bands

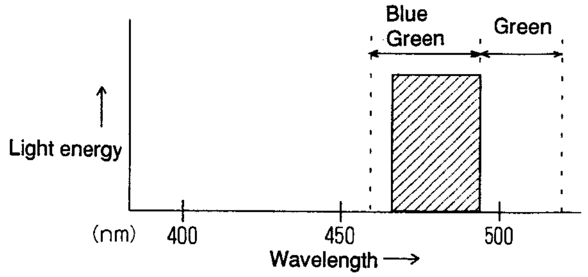
For explanation of color difference relative to wavelength difference, intermediate blue green are taken up for an example.

(Ex): Blue green is an intermediate color of blue and green. Even though the light energy is the same, if "wavelength band" deviates to blue. The color is bluish blue green. If, on the other hand, the wavelength band deviates to green, it produces greenish blue green.

(Greenish blue green)



(Blue green with more green)

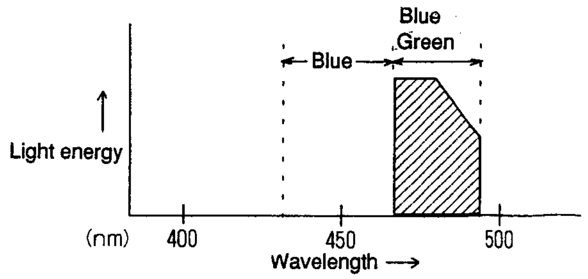


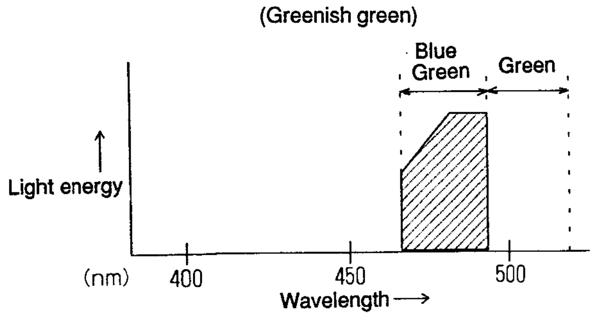
### B. Color difference according to a difference in light distribution

Intermediate blue green is taken up for an example to explain color difference relative to a difference in light energy distribution.

(Ex): Even though the wavelength is the same, if the light energy near blue is stronger, it produces bluish blue green. If the light energy near green is stronger, it produces greenish blue green.

(Bluish blue green)





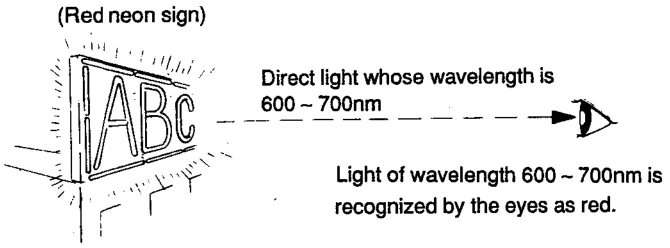
## 3. Kinds of lights recognized by eyes

There are three kinds of lights recognized by human eyes: light source color, surface color, and transmittive color

### A. Light source color

It is the color of light emitted from a light emitting body. The color is dependent on the light wavelength and energy distribution.

(Ex): A red neon sign looks red because the light of wavelength 600 ~ 700nm is emitted from the red neon sign.

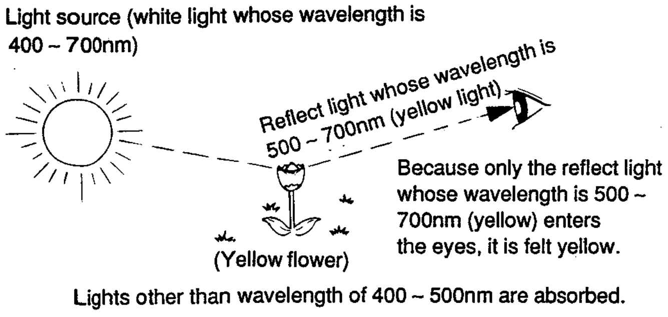

(Red neon sign)
ABC
Direct light whose wavelength is 600 ~ 700nm

Light of wavelength 600 ~ 700nm is recognized by the eyes as red.

### B. Surface color

It is the color of light reflected from the surface of an object. In this case, the color is dependent on the wavelength bands absorbed by the object and the wavelength bands of the light reflected.

*Ex): Yellow flower looks yellow because yellow flower reflects the wavelength of 500 ~ 700nm (yellow light) and other wavelengths are absorbed by the flower.


Light source (white light whose wavelength is 400 ~ 700nm)
Reflect light whose wavelength is 500 ~ 700nm (yellow light)
(Yellow flower)

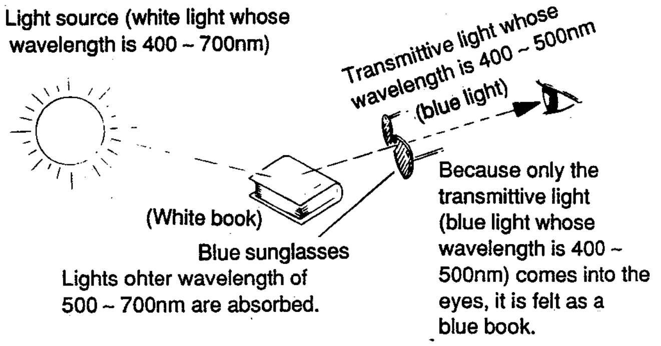
Because only the reflect light whose wavelength is 500 ~ 700nm (yellow) enters the eyes, it is felt yellow.

Lights other than wavelength of 400 ~ 500nm are absorbed.

### C. Transmittive color

It is the color of light that transmitted through an object. In this case, the color is dependent on the wavelength bands absorbed by the object and the wavelength bands of the light transmitted.

(Ex): When an object is seen through the blue sunglass, the object looks blue because the blue sunglass transmits the light of wavelength 430 ~ 470nm (blue color) and other wavelengths are absorbed by the sunglass.


Light source (white light whose wavelength is 400 ~ 700nm)
Transmittive light whose wavelength is 400 ~ 500nm (blue light)
(White book)
Blue sunglasses

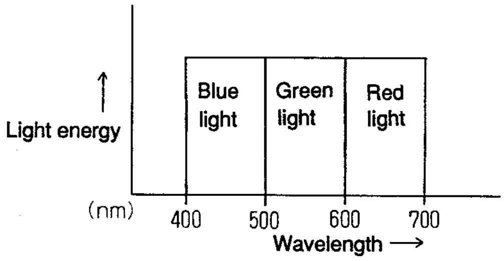
Lights ohter wavelength of 500 ~ 700nm are absorbed.

Because only the transmittive light (blue light whose wavelength is 400 ~ 500nm) comes into the eyes, it is felt as a blue book.

## 4. Three primary colors

Daylight (sunlight) consists of blue (400 ~ 500nm), green (500 ~ 600nm), and red (600 ~ 700nm). These colors are called three primary colors.

(Three primary color spectrum characteristics)



## 5. Additive mixture of colors and subtractive mixture of colors

Human eyes feel a color by the total sum of three primary colors contained within the light. There are two ways of artificially creating colors by utilizing this nature; additive mixture of colors and subtractive mixture of colors.

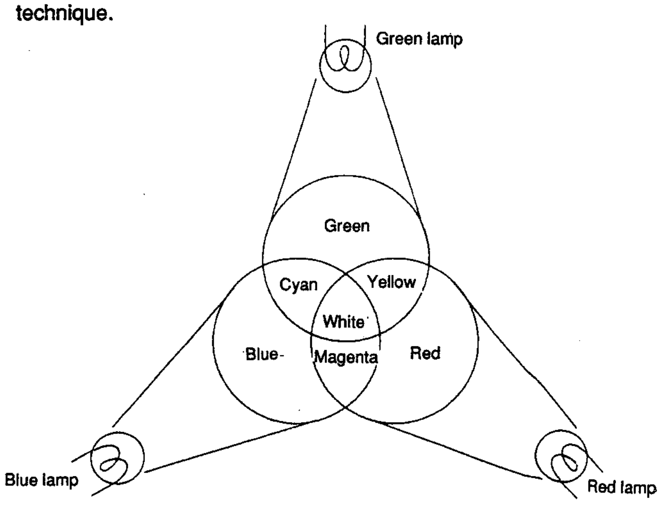
### A. Additive mixture of colors

With this method, three primary colors of red, green, and blue are added to control light components (energy, wavelength bands) to produce a variety of colors.

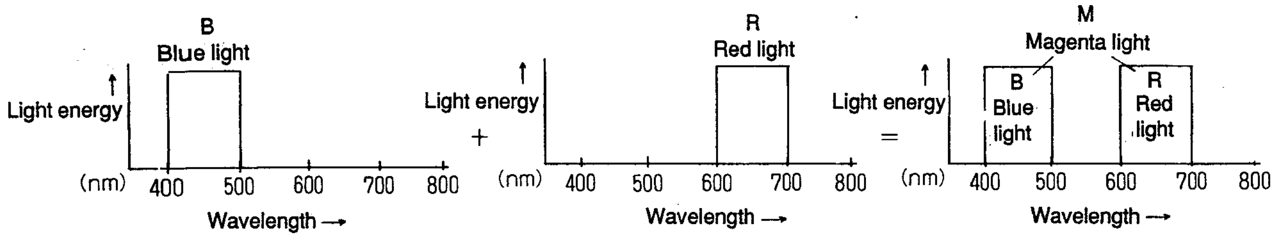
As three primary colors of red, green, and blue are added together, you will produce a variety of colors. And, lighter or different color can also be produced by adjusting the rate of light energy.

When green light is added to red light, it will be felt yellow. Further adding more blue light, it will become white.

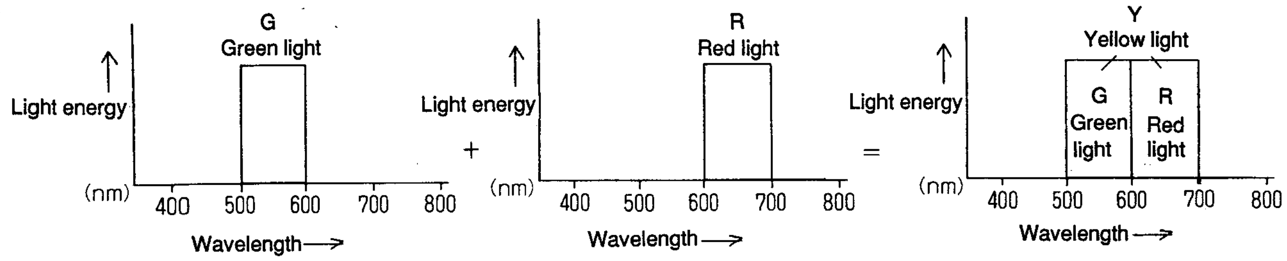
When blue light is added to red light, it felt magenta. Adding green to blue light produces cyan color. This theory is utilized in the color TV technique.


Green lamp
Green
Cyan
Yellow
White
Blue
Magenta
Red
Blue lamp
Red lamp

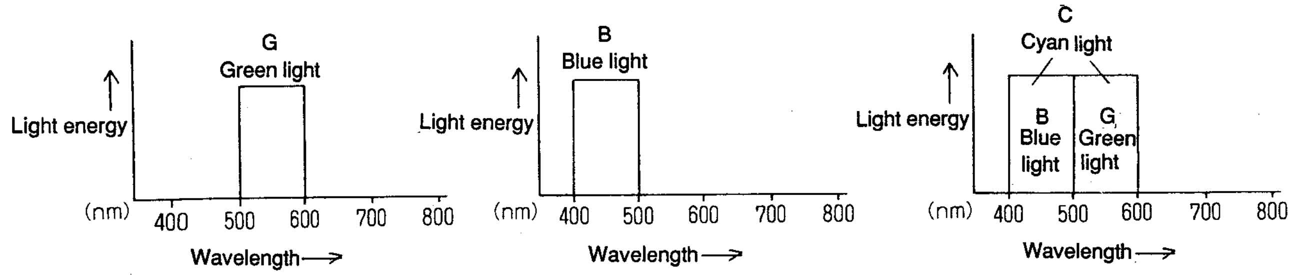
Blue light (400 ~ 500nm) + red light (600 ~ 700nm) = magenta light (400 ~ 500nm, 600 ~ 700nm)


B
Blue light
Light energy
(nm) 400 500 600 700 800
Wavelength →
+
R
Red light
Light energy
(nm) 400 500 600 700 800
Wavelength →
=
M
Magenta light
B
Blue light
R
Red light
Light energy
(nm) 400 500 600 700 800
Wavelength →

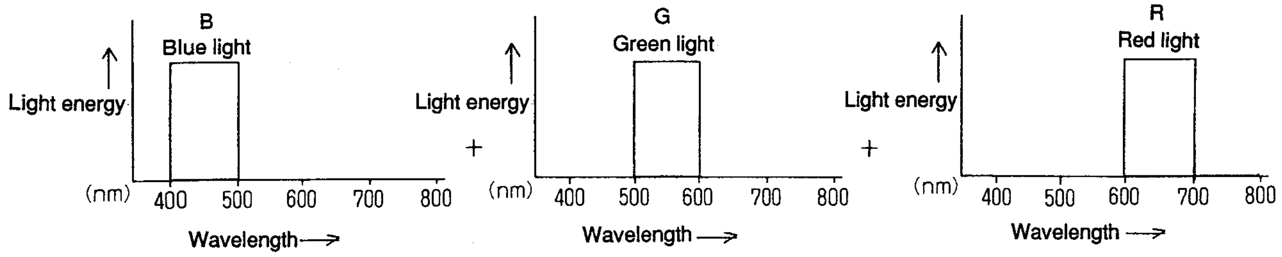
Green light (500 ~ 600nm) + red light (600 ~ 700nm) = yellow light (*500 ~ 700nm)

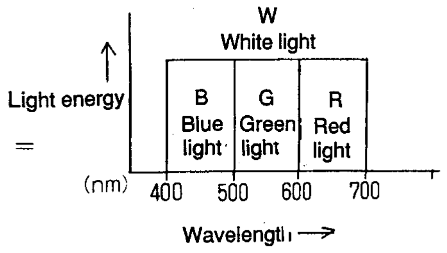

G
Green light
Light energy
(nm) 400 500 600 700 800
Wavelength →
+
R
Red light
Light energy
(nm) 400 500 600 700 800
Wavelength →
=
Y
Yellow light
G
Green light
R
Red light
Light energy
(nm) 400 500 600 700 800
Wavelength →

Green light (500 ~ 600nm) + blue light (400 ~ 500nm) = cyan light (400 ~ 600nm)


G
Green light
Light energy
(nm) 400 500 600 700 800
Wavelength →
B
Blue light
Light energy
(nm) 400 500 600 700 800
Wavelength →
C
Cyan light
B
Blue light
G
Green light
Light energy
(nm) 400 500 600 700 800
Wavelength →

Blue light (400nm ~ 500nm) + Green light (500 ~ 600nm) + Red light (600 ~ 700nm) = White light (400 ~ 700nm)


B
Blue light
Light energy
(nm) 400 500 600 700 800
Wavelength →
+
G
Green light
Light energy
(nm) 400 500 600 700 800
Wavelength →
+
R
Red light
Light energy
(nm) 400 500 600 700 800
Wavelength →


=
W
White light
B
Blue light
G
Green light
R
Red light
Light energy
(nm) 400 500 600 700
Wavelength →

| Color | Three primary color |
|---|---|
| R | R |
| G | G |
| B | B |
| Y | R + G |
| M | R + B |
| C | G + B |
| W | R + G + B |
| BK | – |

Table right shows summary of the above descriptions.

R: Red
G: GREEN
B: Blue
Y: Yellow
M: Magenta
C: Cyan
W: White
Bk: Black

## B. Subtractive mixture of colors

With the subtractive mixture of colors, a variety of colors can be produced by a mixture of three coloring matters of yellow, magenta, and cyan which are complementary colors of three primary colors of red, green, and blue. A coloring matter has the characteristics to absorb light of a specific color. A different coloring matter absorbs light of a different color.

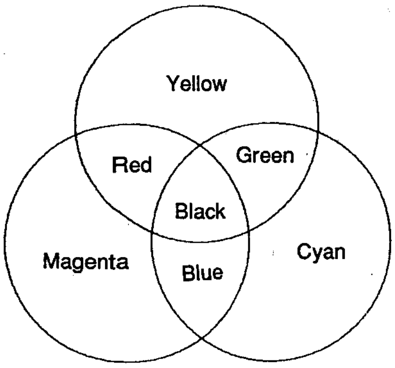
Yellow coloring matter absorbs blue light (400 ~ 500nm), magenta coloring matter green light (500 ~ 600nm), and cyan coloring matter red light (600 ~ 700nm). Colors which are not absorbed are reflected to enter the eyes.

In the subtractive mixture of colors, in other words, various light components (energy, wavelength) are removed (absorbed) by the three coloring matters from white color and a color is felt with the remaining color component (energy, wavelength of reflected light).

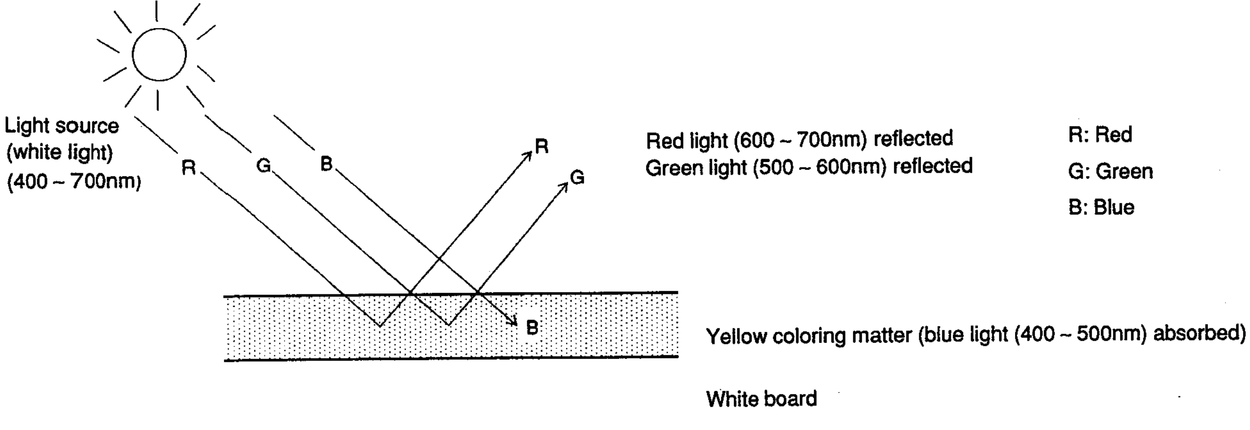
When yellow, magenta, and cyan coloring matters are mixed, a variety of colors could be produced. The more coloring matters are added, the darker the color is felt.

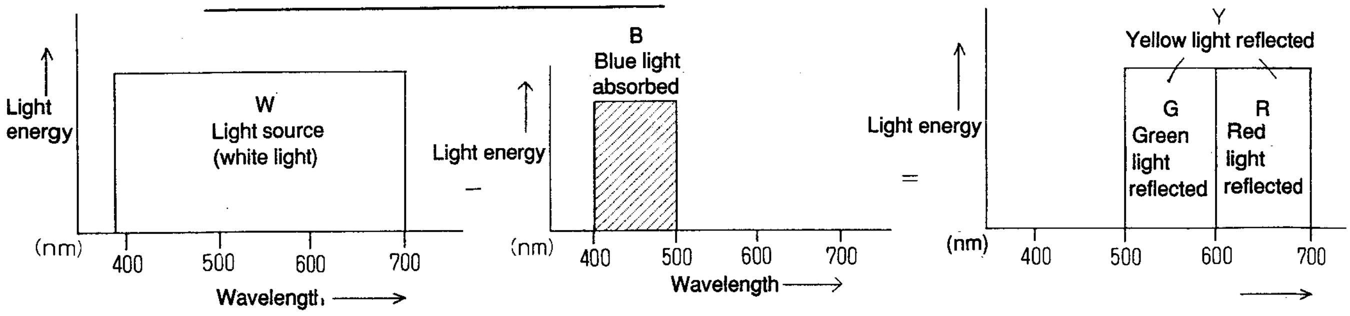
When cyan coloring matter is mixed to yellow coloring matter, it will be felt green. When magenta coloring matter is added, it felt black.

When magenta coloring matter is mixed with yellow coloring matter, it is felt red. When cyan coloring matter is added to magenta coloring matter , it is felt blue.


Yellow
Red
Green
Black
Magenta
Blue
Cyan

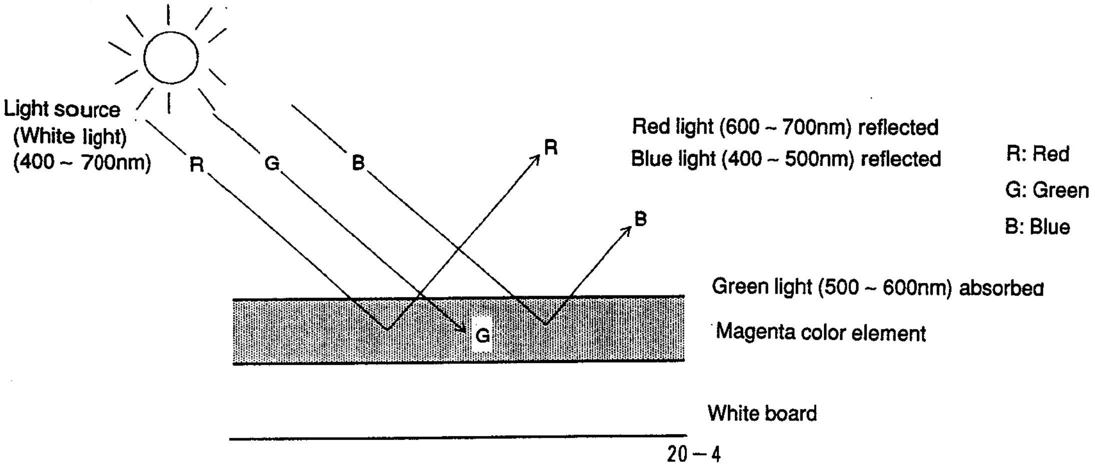
## (1) Why yellow coloring matter is felt yellow

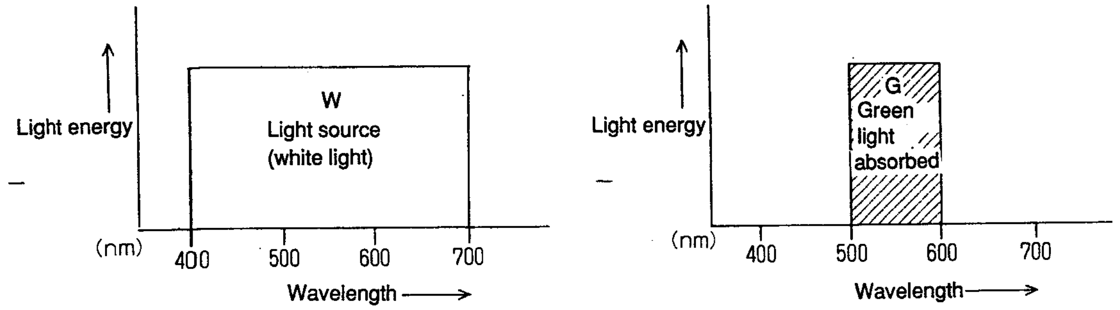

Light source
(white light)
(400 ~ 700nm)
R
G
B
R
G
B
Red light (600 ~ 700nm) reflected
Green light (500 ~ 600nm) reflected
R: Red
G: Green
B: Blue
Yellow coloring matter (blue light (400 ~ 500nm) absorbed)
White board

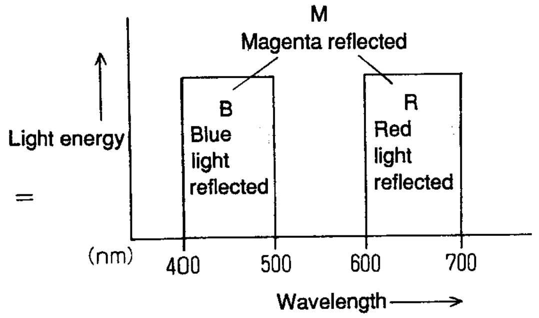


Yellow coloring matter absorbs blue light (400 ~ 500nm) and reflects red light (600 ~ 700nm) and green light (500 ~ 600nm), it will be felt yellow which is the color of mixture of green light and red light.

## (2) Why magenta coloring matterial is felt magenta

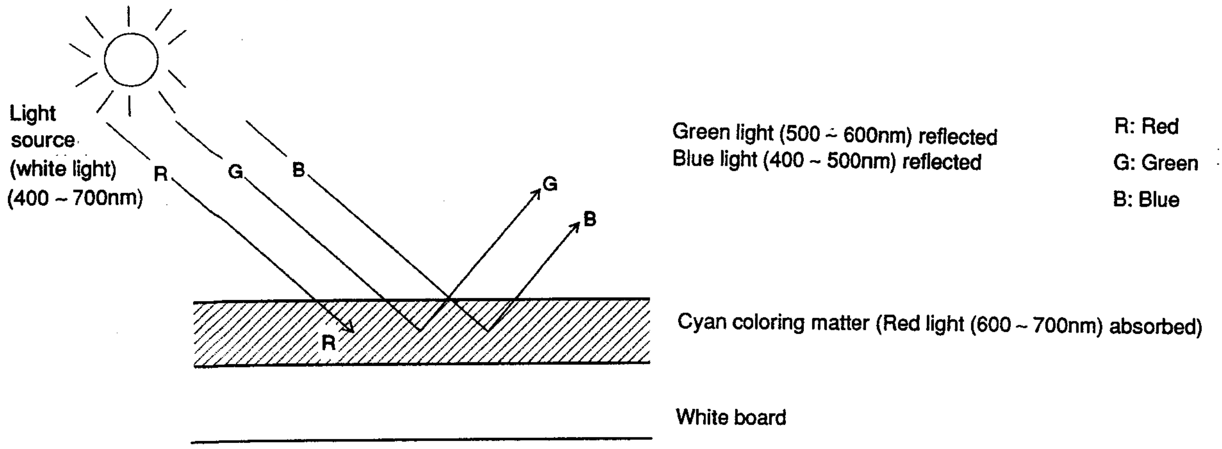

Light source
(White light)
(400 ~ 700nm)
R
G
B
R
B
G
Red light (600 ~ 700nm) reflected
Blue light (400 ~ 500nm) reflected
R: Red
G: Green
B: Blue
Green light (500 ~ 600nm) absorbed
Magenta color element
White board

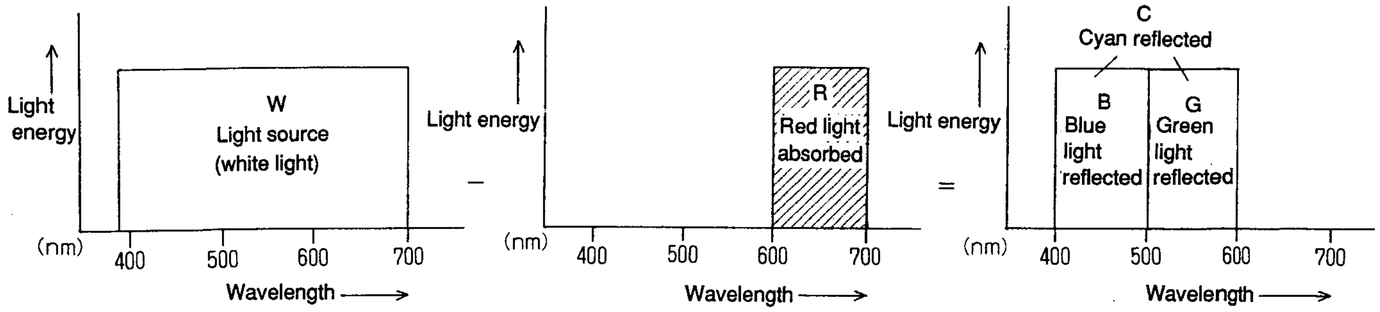




Magenta coloring matter absorbs green light (500 ~ 600nm) and reflects blue light (400 ~ 500nm) and red light (600 ~ 700nm), it will be felt magenta which is the color of mixture of red light and blue light.

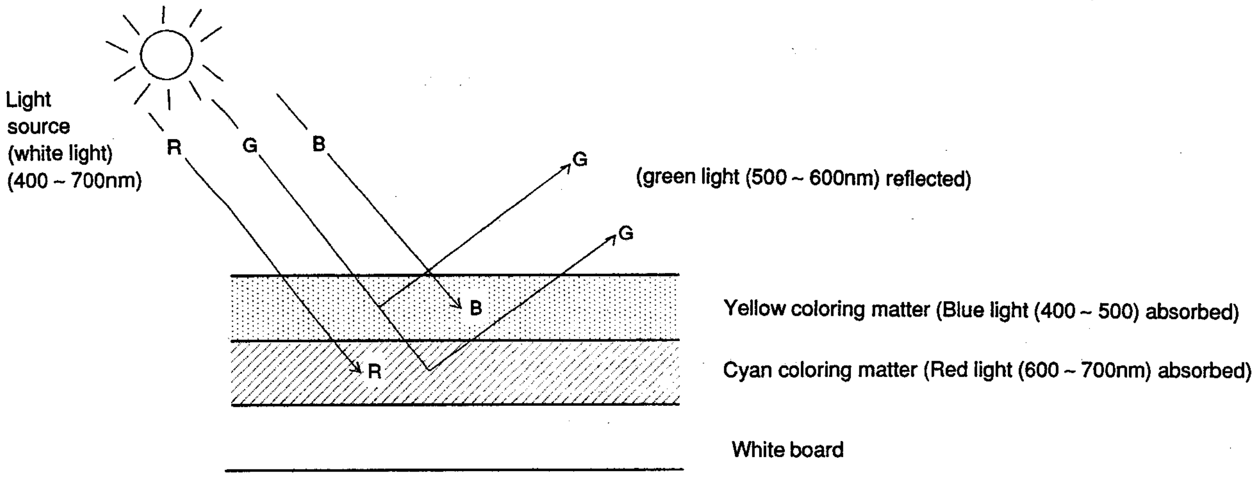
### (3) Why cyan coloring matter is felt cyan


Light source (white light) (400 ~ 700nm)
R
G
B
G
B
R
Green light (500 ~ 600nm) reflected
Blue light (400 ~ 500nm) reflected
R: Red
G: Green
B: Blue
Cyan coloring matter (Red light (600 ~ 700nm) absorbed)
White board

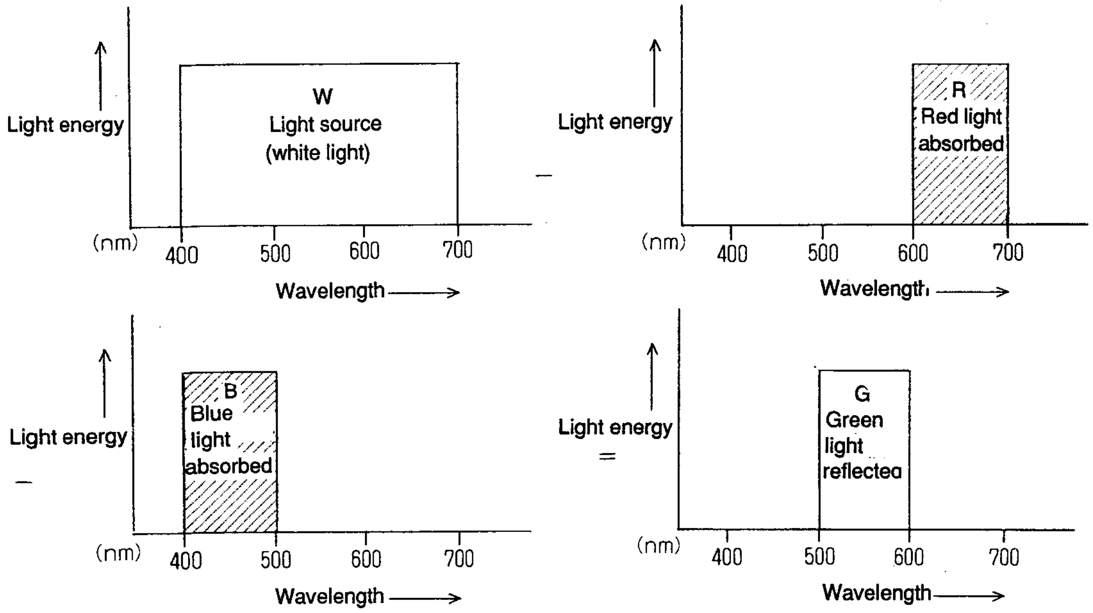


Cyan coloring matter absorbs red light (600 ~ 700nm) and reflects blue light (400 ~ 500nm) and green light (500 ~ 600nm), it will be felt cyan which is the color of mixture of green light and blue light.

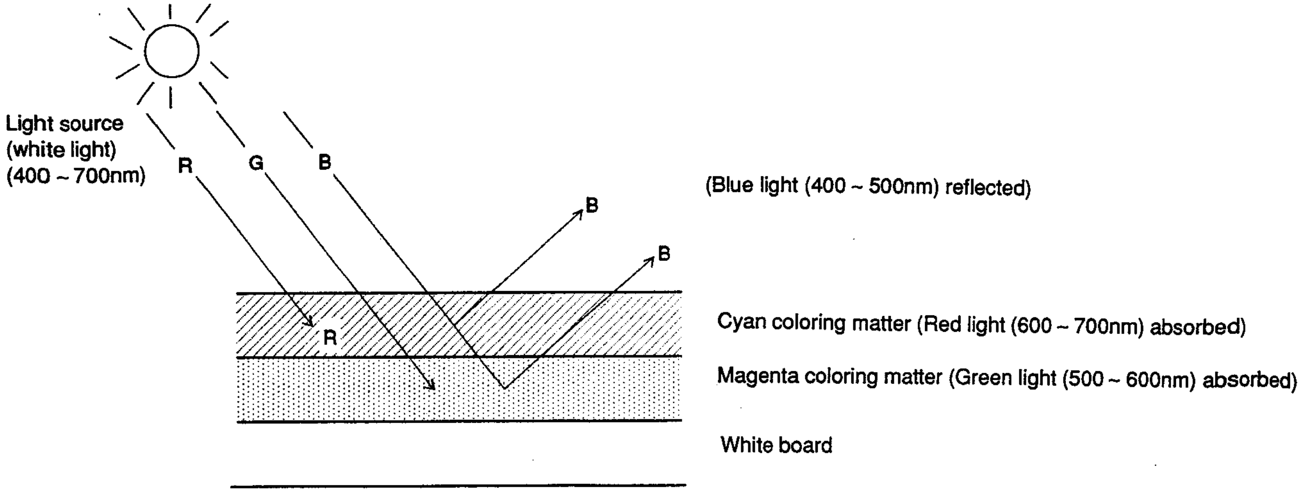
## (4) Why the mixture of cyan and with yellow coloring matters is felt green


Light source (white light) (400 ~ 700nm)
R
G
B
G
G
(green light (500 ~ 600nm) reflected)
B
R
Yellow coloring matter (Blue light (400 ~ 500) absorbed)
Cyan coloring matter (Red light (600 ~ 700nm) absorbed)
White board

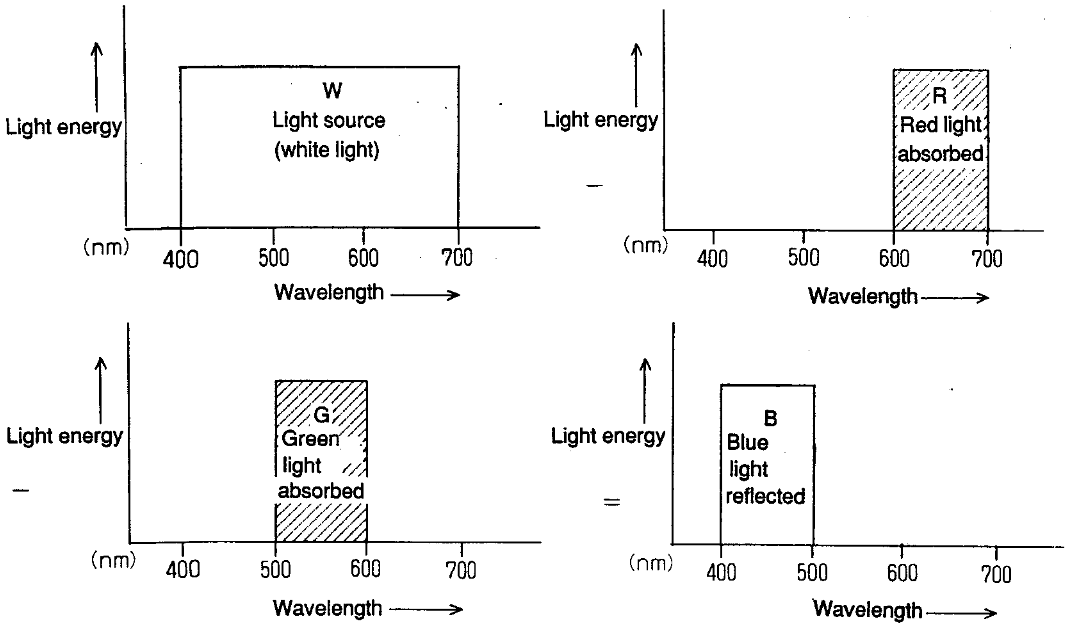
Yellow coloring mattere absorbs blue light (400 ~ 500nm) and cyan coloring matter absorbs red light (600 ~ 700nm). As the other light, green light (500 ~ 600nm), is reflected, it will be felt green.



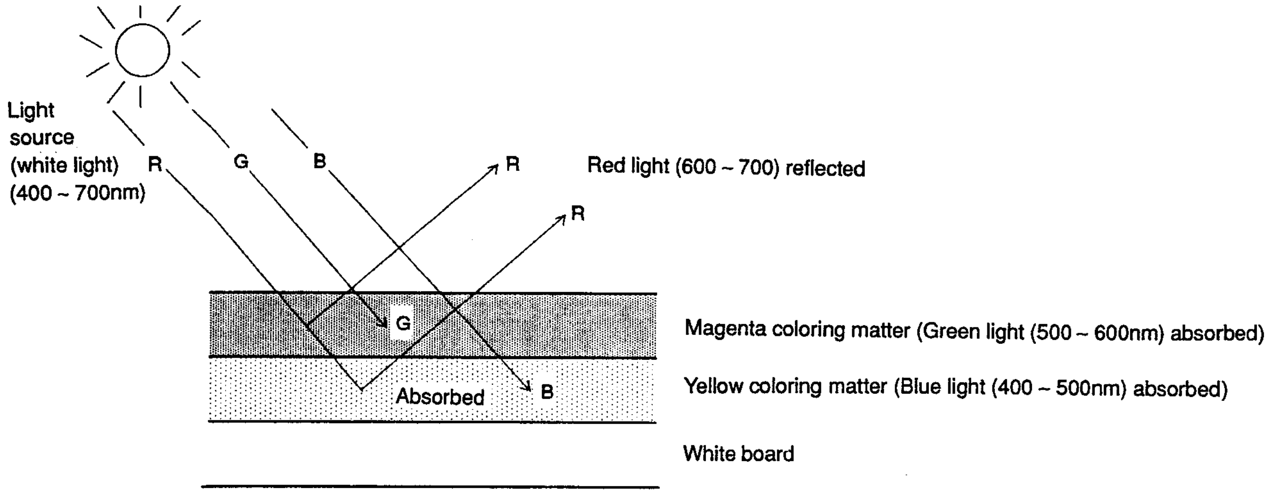
## (5) Why the mixture of cyan and magenta coloring matter is felt blue


Light source (white light) (400 ~ 700nm)
R
G
B
(Blue light (400 ~ 500nm) reflected)
B
B
R
Cyan coloring matter (Red light (600 ~ 700nm) absorbed)
Magenta coloring matter (Green light (500 ~ 600nm) absorbed)
White board

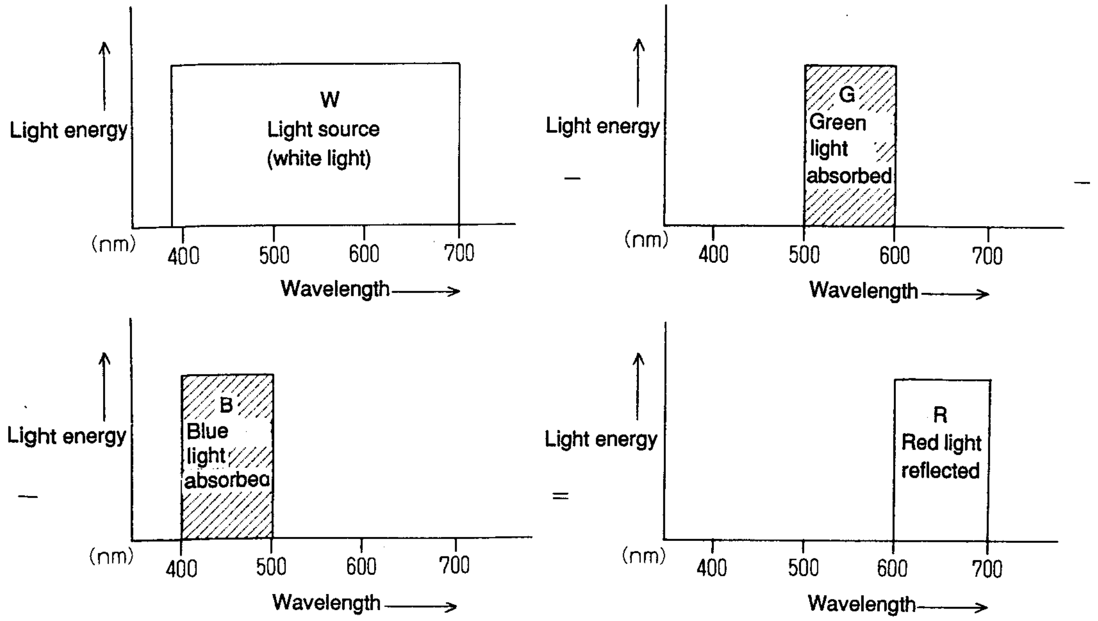
Cyan coloring matter absorbs red light (600 ~ 700nm) and magenta coloring matter absorbs green light (500 ~ 600nm). It will be felt blue (400 ~ 500nm) as only blue is reflected.



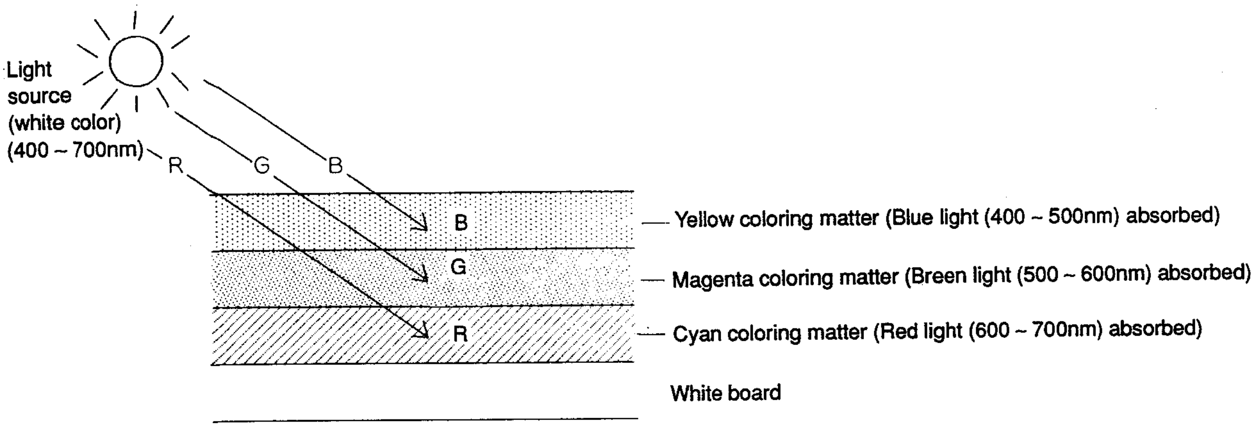
## (6) Why the mixture of magenta and yellow coloring matters is felt red


Light
source
(white light)
(400 ~ 700nm)
R
G
B
R
R
Red light (600 ~ 700) reflected
G
Absorbed
B
Magenta coloring matter (Green light (500 ~ 600nm) absorbed)
Yellow coloring matter (Blue light (400 ~ 500nm) absorbed)
White board

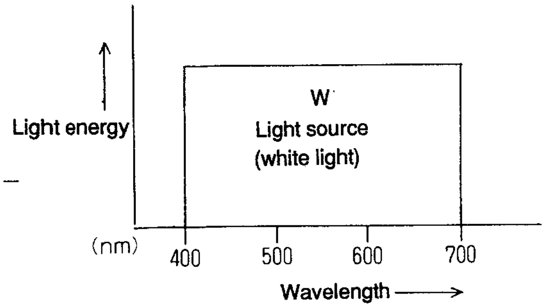
Magenta coloring matter absorbs green light (500 ~ 600nm) and yellow coloring matter absorbs blue light (400 ~ 500nm). It will be felt red (600 ~ 700nm) as only red is reflected.

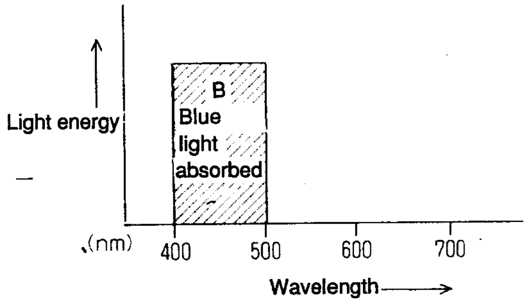


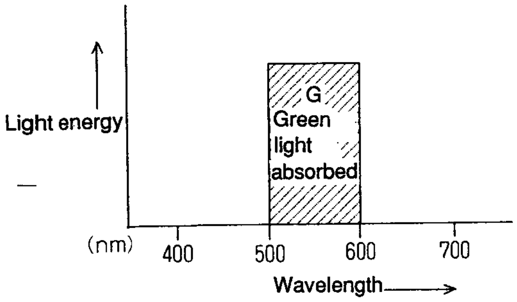
## (7) Why the mixture of magenta yellow, and cyan coloring matters is felt black

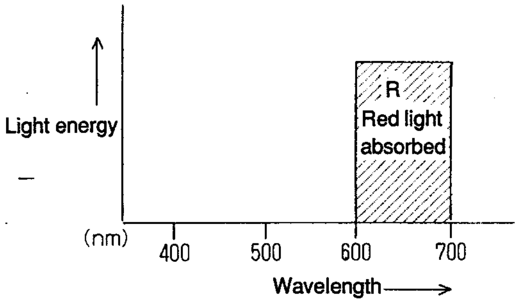

Light
source
(white color)
(400 ~ 700nm)
R
G
B
B
G
R
Yellow coloring matter (Blue light (400 ~ 500nm) absorbed)
Magenta coloring matter (Breen light (500 ~ 600nm) absorbed)
Cyan coloring matter (Red light (600 ~ 700nm) absorbed)
White board

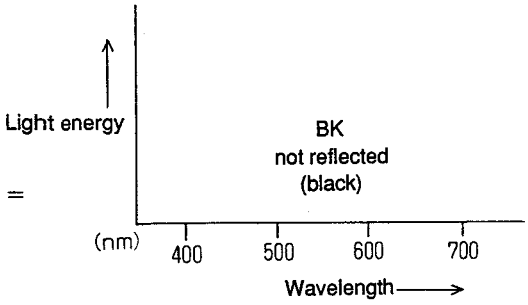
Yellow coloring matter absorbs blue light (400 ~ 500nm), magenta coloring matter green light (500 ~ 600nm), and cyan coloring matter red light (600 ~ 700nm). It will be therefore felt black as nothing is reflected in this case.











See the table right for summary of the above descriptions.

| Light<br>Color element | Absorbed light | Reflected light |
|---|---|---|
| Y | B | Y = R + G = W – B |
| M | G | M = R + B = W – G |
| C | R | C = G + B = W – R |
| Y + M | C = B + G | R = W – C = W – (B + G) |
| M + C | Y = G + R | B = W – Y = W – (G + R) |
| Y + C | M = B + R | G = W – M = W – (B + R) |
| Y + M + C | W = R + G + B | (BK) = W – (R + G + B) |

- W – absorbed light = reflected light
  Where, W is white. BK is black
- Absorbed light and reflected light are complementary each other.

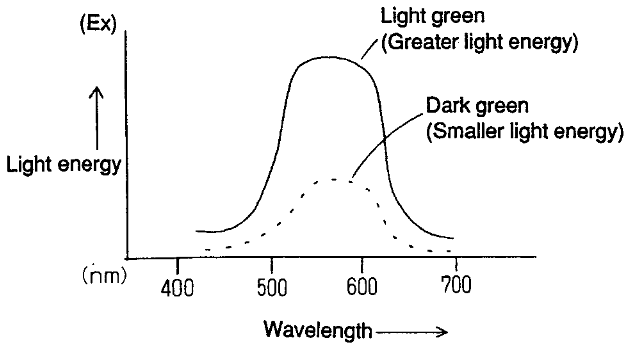
  This rule is utilized in color printing and color copying. In the additive mixture, lights are mixed, and light color can be obtained. While in the subtractive mixture, coloring matters are mixed, and light color cannot be obtaned.

## 6. Three elements of color (brightness, hue, saturation)

Color has three elements: brightness, hue, and saturation.

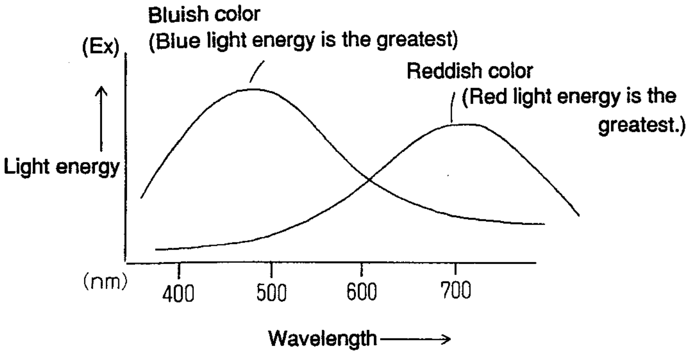
### A. Brightness

Brightness is the intensity of light (energy). The higher the brightness is, the brighter the color is felt.



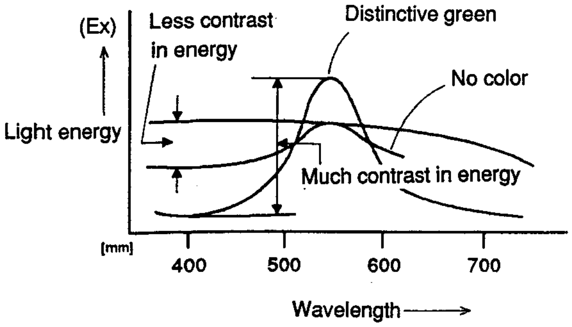
### B. Hue

Hue makes distinction of colors. It is determined by the wavelength of the strongest light (light of greatest energy).



### C. Saturation

Saturation is the degree of contrast of color. Color is felt more clearly where there is much contrast between high energy portion and low energy portion of light component. On the contrary, clearness decreases where there is less contrast between high energy portion and low energy portion of light component.



## CAUTION FOR BATTERY REPLACEMENT

(Danish) ADVARSEL !

Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri
af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandoren.

(English) Caution !

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type
recommended by the equipment manufacturer.
Discard used batteries according to manufacturer's instructions.

(Finnish) VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan
tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden
mukaisesti.

(French) ATTENTION

Il y a danger d'explosion s' il y a remplacement incorrect
de la batterie. Remplacer uniquement avec une batterie du
même type ou d'un type recommandé par le constructeur.
Mettre au rébut les batteries usagées conformément aux
instructions du fabricant.